EOS 1.2
Innovative
New Operating
ystem For The C-64

HACKER II: Doomsday Papers
Steve Cartwright Interviewed

THE Guide TO COMPUTER LIVING

FOR COMMODORE™ OWNERS

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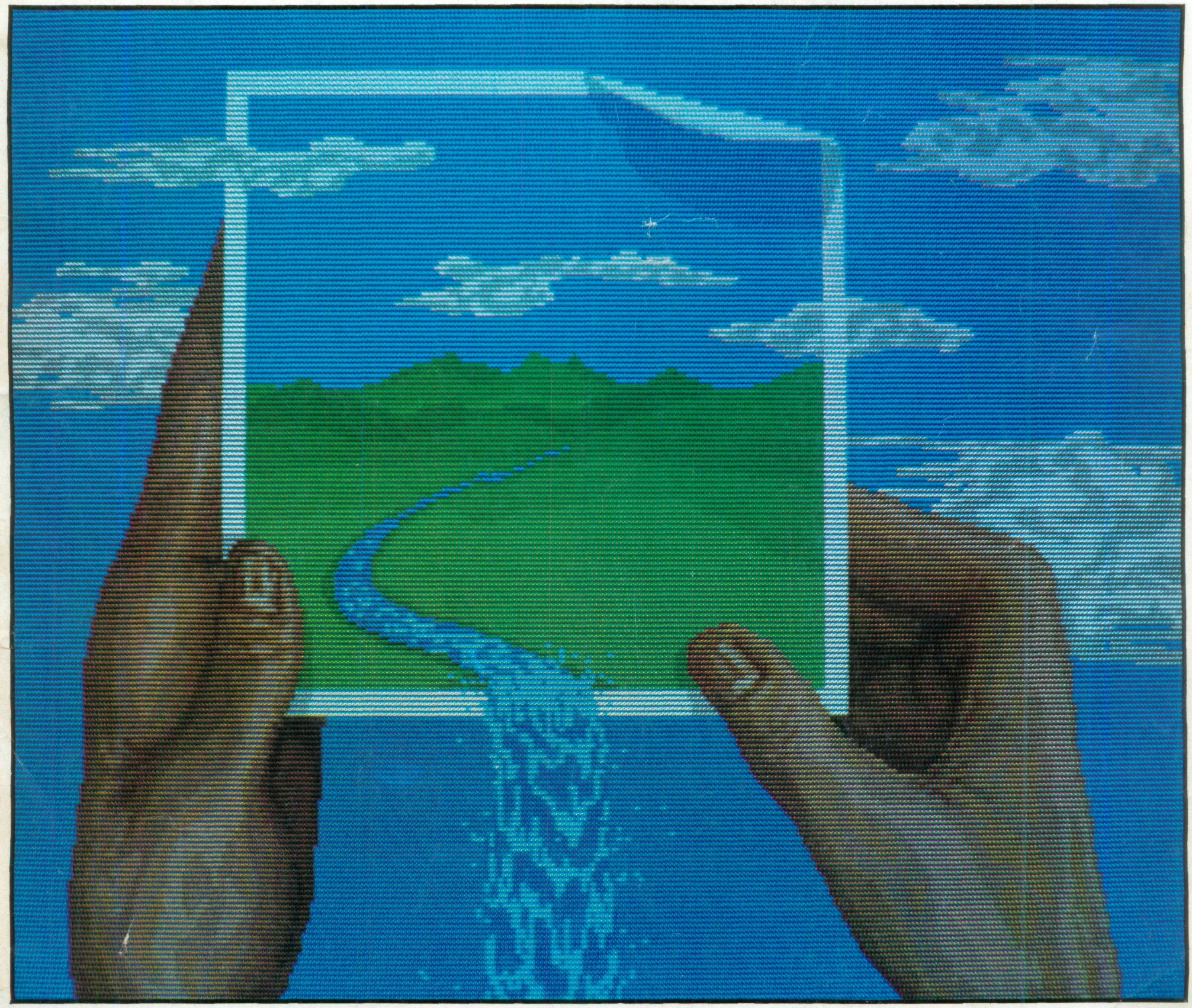

Who In The World Is Carmen Sandiego?


128
TIMEWORKS
Personal Computer Software
PARTNER 128
A cartridge-based product with eight convenient memory-resident desk top "accessories" that operate "concurrently" with other C128 software programs.
MAY
Appointment Calendar
Memo Pad
Phone Book & Auto Dialer
Address Book
Calculator
Typewriter
Label Maker
Screen Printer
MONEY BACK GUARANTEE

ROBERTS' RULES OF INALIENABLE COMPUTER ORDER

1 You will never have an extra blank disk.

2 If you do bring along a blank disk, you won't need it.

3 If you don't bring along a blank disk, it will be the only available opportunity to obtain a copy of a hitherto unattainable, and uniquely appropriate program.

4 If someone else is watching while you are doing anything on the computer, anything at all, it will screw up. (a technical term.)

5 The percentage chances of screwing up increase in direct proportion to the size of your audience. If you are demonstrating anything to a User Group your chances of crashing are about 487 to one in favor. But if you should happen to be demonstrating anything on national television, you don't really have a chance. Or a prayer.

6 No matter how simple it seems to you, your explanation will be more than s/he wants to know.

7 You will amaze yourself at how much you know.

8 You will amaze your Mother at how much you know about computers.

9 Your Mother will believe that you have an alternate career just waiting to throw money at you.

10 Your Mother will be wrong.

11 None of your old friends will want to play computer with you.

12 You will make new friends.

13 You will always have one disk envelope too few. Or too many.

14 The only pieces of data you will ever lose are the ones you were going to save just as soon as you finished typing a couple more lines.

15 Any game you beat persons under the age of 9 at will automatically be deemed too easy.

16 The update of your program will use the keys for something entirely different in this version than it did when you first learned it.

17 The longer the copyright notice, the faster the program will get cracked.

18 You will not understand it the first time you read it in the manual.

19 You will understand it better the next time you read the manual. For no discernible reason.

20 When you are late for an interview and need a last minute copy of your resume your printer will go down. It will always go down. It doesn't care.

21 Nowhere in your repair manual will it ever tell you what you really need to do - which is to turn the damn thing off and get yourself a cup of tea.

22 You will never know what a user file is.

23 The price of anything you buy will stay the same until the actual impact of your money on the bottom of the cash drawer, at which time it will automatically re-list itself in next Thursday's paper at 30% less.

24 Staring at the screen for 97 continuous minutes will not necessarily reveal to you the secret location of any colon that should have been typed in as a semi. Or vice versa.

25 It will always seem like your friend got a better deal.

26 No program you get from the New York Times will run on your computer.

27 The 800 number will be busy.

* * *

The guide's own Shelly Roberts does it again! Roberts' Rules of Inalienable Computer Order make Murphy look like a straight man.

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THE GUIDE TO COMPUTER LIVING

4 Rnd 0 Notes

by Randy Chase

The quest for Commodore's elusive 3½″ disk drive and obituaries for recent computer casualties.

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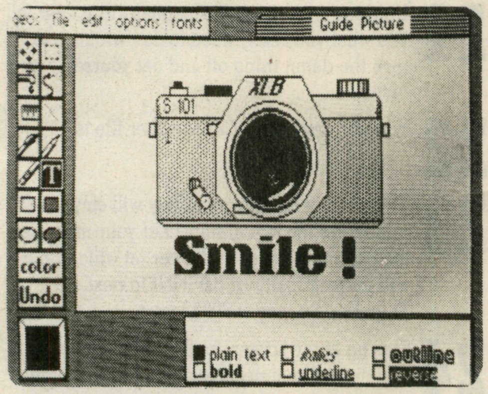

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by Grant Johnson

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by Bob Lindstrom

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by Randy Chase

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Welcome to Peking, the capital of the People's Republic of China. One of this nation's most famous landmarks is the Great Wall.

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Letters to the editor are not only welcomed, but encouraged, and will be printed as space permits.

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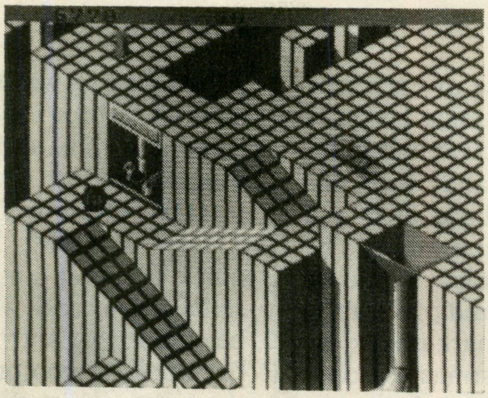

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News, views and cynicism. If they did it, we have something to say about it.

This Month's Cover: Our cover art this month, "The Photo", was created by *Alisa Lowden* with **Deluxe Paint** on an Amiga.

The Guide features high quality original artwork on the cover each month. All artists are encouraged to submit their computer artwork for consideration. The only restriction is that the art must have been created using a Commodore computer. This could be your chance to move that masterpiece from the screen on your monitor to the newsstands of America!

Please submit all artwork on disk, with a cover letter describing the graphics package used to create it. It will be photographed from the screen, so screen dump capability is *not* a requirement.

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Introducing

Dr. Timothy Leary!

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RND (0) Notes:

On-Again, Off-Again

Commodore Reconsiders The Elusive 1581!

by Randy Chase

I thought it would be nice to start off on a postive note this month and focus first on the good news. Rumor has it that the next quarterly financial statements from Commodore will be quite positive, and, we hope, will mark the beginning of their climb back to secure financial footing. The combination of continuing sales and the streamlining of expenses from the succession of layoffs should provide a quarterly statement that will prove more acceptable to the bankers.

With the release of each new software title, the Amiga becomes an even more attractive and competitive machine, and with the combination of a little luck and some aggressive marketing by Commodore the Amiga should be quite comfortably (and profitably) established in the marketplace by the end of the Christmas season.

The 128 PC is proving to be the unnoticed hit of the year with unconfirmed reports of sales nearing 700,000. Only time will tell how acceptable the "new" 64 is going to be to consumers, but for the time being most stores still have the "old" beige standard available for those customers looking for the lower price. All in all, it looks to be a very promising Christmas for Commodore.

Now You See It . . .

Two winters ago in Las Vegas, Commodore *first showed* their 3½" disk drive to the public.
At the time, it was being shown
a peripheral for the LCD Lap-he
computer *that* shortly thereaft
disappeared into the depths of c
porate Commodore. Sever
sources at CBM, however, w
quick to point out that it was
serial drive, and was designed
be compatible with the full line
Commodore computers (which
the time consisted of the 64,
Vic-16, the Plus/4 and the
releases at that show: the 128
and the portable).

Since then, the fast little d
has been merely a topic of spec
tion and fantasy; that *is,*
Chicago this summer, when C
modore announced that the d
would be released this fall. As
story was told at CES, it was si
ly a matter of awaiting
approval.

The biggest single flaw in
over-all line of Commodore
ducts has been the limited cap
and tortoise-speed of the
While the 1571 with its *dou*

capacity and its burst mode was a step in the right direction, it was just an improvement, not the solution to this major flaw in system design. The 3½″ drive is the biggest news for Commodore owners since the "super 64" finally materialized as the 128. At last, owners of the most powerful and affordable small computers were going to have the option of upgrading to a disk drive capable of radically expanding the power and productivity of their systems.

. . . And Now you Don't!

But, as is often the case in the world of high-tech intrigue, things aren't always what they seem to be. Now that Commodore has dangled the teasing temptation, and the press has extolled the virtues and whetted the appetites of their readers, it seems that the imminent release of the 1581 drive was somewhat prematurely announced. Several key software developers are reporting now that they're being told that to date Commodore hasn't made the decision to put the new drive into production. It seems that they aren't sure if there is really a market for it!

This is too important a product to be shuffled into the twilight zone. Not only would it solve so many problems for Commodore's very faithful customers, but it would also prove to be a very marketable (i.e. profitable) addition to the Commodore line. It would also propel the 128 into a whole new level of acceptance as a serious productivity tool.

There are so many overwhelmingly good reasons to release the 1581 that it's hard to believe there is any hesitation to rush this product to the shelves. While Commodore is huddling with their bankers, trying to design a game plan for the Christmas season, it's time for the public to raise their collective voice and ask for the 1581 drive. Before some accountant condemns the 1581 to the same dark and dusty warehouse where they keep their prototype lap-helds (and Max game machines), let's see if we can't impress upon our friends at Commodore that there are indeed a large number of people eagerly awaiting the opportunity to provide a good home for a *real* disk drive for the 64 or their 128.

R.I.P.

It's not unusual in this rapidly evolving business to see companies fade as fast as they appear. Often it seems that they disappear in droves. It came as a shock to many, however, to see such major players as Cardco and Conroy La Point both appear on the casualty lists. Cardco had become a household word in the Commodore world. Building on the success of their printer interfaces, they expanded and diversified into a wide variety of projects and products. Evidently they expanded and diversified themselves right into the ground. I hear reports that by the time you read this, however, they will have resurfaced in a new personna and will be shipping their expansion boards for the Amiga.

Conroy probably isn't that common a name among the newer Commodore owners. It's been a while now since they phased themselves out of the Commodore market, but they none-the-less were one of the biggest mail order operations in the country. Most reports I'm hearing aren't very optimistic that they'll survive the reorganization they're attempting. Their demise, apparently is tied to their efforts at marketing their own PC Clone, the Magnum.

In light of the over-saturated clone market, Commodore's decision not to bring to the U.S. the PC clones that they market in Canada seems better all the time. With so many new clones appearing, and just as many fading, perhaps it's a very wise move on their part to instead focus their efforts on establishing a much more unique niche for themselves with the Amiga.

One other casualty, albeit of a different nature, that sadly needs reporting this month is Commodore's **Musicraft**. Even in its unfinished (and mostly disabled) demo form, this was a very impressive piece of software. It's a shame to see one of the most promising musical tools for the Amiga fall victim to internal changes and politics. It would have been a far more impressive product to promote than **TextCraft**.

While we're on the subject of Commodore software, it's curious to note that I've had many reports from both dealers and consumers that **Sky Travel** isn't readily available. This delightfully entertaining and incredibly powerful gem is perhaps the best peice of software that Commodore's ever had the privilege of putting their name on; yet dealers report that they can't get a reliable supply of product for their shelves. And while we're talking about Sky Travel, why haven't they released a version for the Amiga?

CompuServe . . .

Still On the Way

Last month, I promised details on our up-coming involvement with CompuServe. Well, due to some bureaucratic delays, the project is running a little behind schedule. You can expect, however, to find *The Guide* online in the next few weeks. Keep your eyes open and your modems warm, we'll be there shortly in what we hope will be a unique forum for the exchange of information. We'll have more details next month.

In Closing

Here's an amusing little tidbit for those of you with a 128. Try typing

```
SYS 32800,123,45,6
```

on your READY screen. Then press [RETURN] and see what happens.

Coming Next Month . . .

Well, I'd better wrap this up. Next month's issue is going to take a serious (?) look at the intriguing topic of "Sex and Computers". If I'm going to have anything to contribute, I guess I'd better get busy and do some research . . . .

■

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Coming

Next Month...

Sex And Computers!

To The Editor

June 17,1986

Mr. Robert J. Sodaro
c/o *The Guide*
3808 S.E. Licyntra Ct.
Portland, OR 97222

Dear Mr. Sodaro:

Print this if you dare!

I do use the "Mr." with reservation after your degrading remark in your article "Real Gamers Don't Read Instructions" in the June 1986 issue of *The Guide to Computer Living* ! You mention on page 35 " . . . the now defunct VIC-20 (as if anyone cares) . . . ". For your information, there are over 2 million VIC-20 users around the globe!! Just because it is no longer in production doesn't mean that they are *no good!*

I still sell VIC-20's to beginners as they are the least expensive home computer and yet are very powerful. Over the years I have expanded it to 32K and have over 750 programs on disk and 15 or 20 cartridges! So, *I care!!* In addition, many others care! I just subscribed to *The Guide*, and future outbursts of ridicule of the VIC-20 will decide if I am to continue!

Sincerely,

Earl Harvey
Laramie, WY

In Reply . . .

Mr. Harvey,

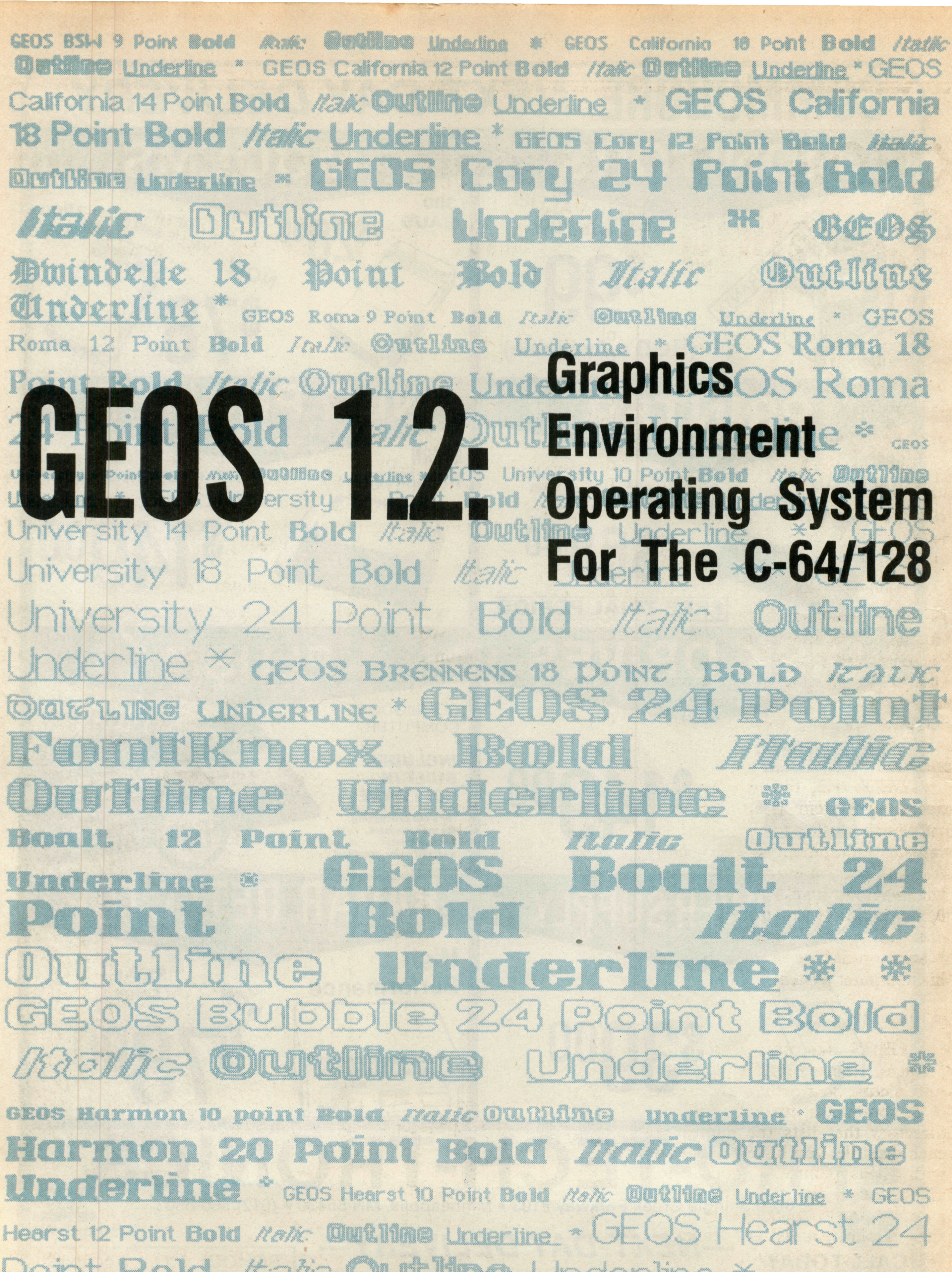
Sorry, I'm sure that Bob wasn't talk about *your* VIC-20 when he asked if anyone cared.

I'll grant your point that the VIC is the cheapest home computer for a beginner (if it *is* still available in your area, but considering the modest price of the 64, I would have to recommend that the beginner go ahead and move all the way *up* to the 64. But then, that's just my opinion . . . . . .

Editor

GEOS 1.2:

Graphics Environment Operating System For The C-64/128



GEOS BSW 9 Point Bold Italic Outline Underline * GEOS California 10 Point Bold Italic Outline Underline * GEOS California 12 Point Bold Italic Outline Underline * GEOS California 14 Point Bold Italic Outline Underline * GEOS California 18 Point Bold Italic Underline * GEOS Cory 12 Point Bold Italic Outline Underline * GEOS Cory 24 Point Bold Italic Outline Underline * GEOS Dwindelle 18 Point Bold Italic Outline Underline * GEOS Roma 9 Point Bold Italic Outline Underline * GEOS Roma 12 Point Bold Italic Outline Underline * GEOS Roma 18 Point Bold Italic Outline Unde OS Roma 24 Point Bold Italic Out e * GEOS University 9 Point Bold Italic Outline Underline * GEOS University 10 Point Bold Italic Outline ersity Point Bold University 14 Point Bold Italic Outline Underline * GEOS University 18 Point Bold Italic University 24 Point Bold Italic Outline Underline * GEOS Brennens 18 Point Bold Italic Outline Underline * GEOS 24 Point FontKnox Bold Italic Outline Underline * GEOS Boalt 12 Point Bold Italic Outline Underline * GEOS Boalt 24 Point Bold Italic Outline Underline * * GEOS Bubble 24 Point Bold Italic Outline Underline * GEOS Harmon 10 point Bold Italic Outline Underline * GEOS Harmon 20 Point Bold Italic Outline Underline * GEOS Hearst 10 Point Bold Italic Outline Underline * GEOS Hearst 12 Point Bold Italic Outline Underline * GEOS Hearst 24 Point Bold Italic Outline Underline * GEOS Channing

GEOS 1.2: Graphics Environment Operating System for C-64/128

```
LOAD"filename",8,1
```

Huh?

```
OPEN15,8,15command
```

Whaaaaaa?

```
PRINT#15, "NEW:name,id"
```

Grrrrrrrrrrrr.

```
PRINT#15, "C:newfile=
oldfile1,
oldfile2, oldfile3,
oldfile4"
```

Aaaaaarrrrggghhhhh!!!!!!

The commands (and the sounds) of Commodore DOS — both are familiar to anyone introducing himself to Commodore's disk operating system. For the beginning user, C-64 DOS is a maze of strange commands and numbers.

GEOS 1.2, the new graphic operating system from Berkeley Softworks, rushes to the rescue as standard equipment in every new 64C and also for every C-64 owner who wants to invest $59.95 to add icons, pull-down menus, windows and the other gadgets of a Macintosh-like user interface to his computer system.

Picture This

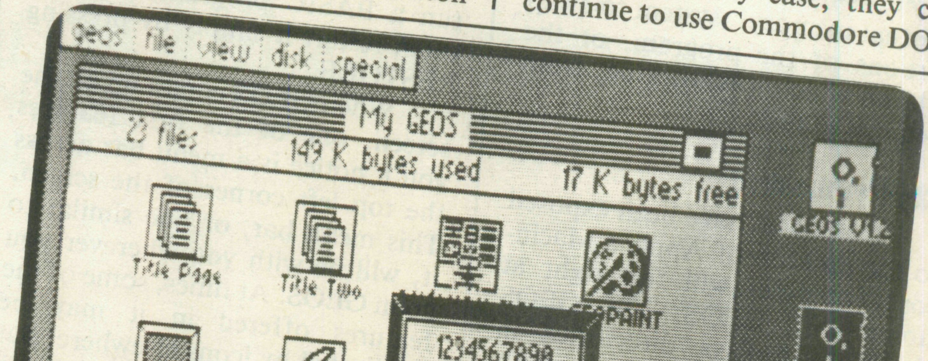
GEOS, like other graphic in- erfaces, is based on the idea that ne picture is worth a thousand OS commands. Instead of a disk irectory that lists the names of ach disk file, you have a *desk*Top ith labeled pictures — icons — to dentify each disk file. And when comes time to load, save or copy les; duplicate a disk; or format a blank disk, you don't have to ember (or look up) some obscure command. Every operation is as easy as selecting and moving icons or picking an item from a pull-down menu bar at the top of the screen.

For instance, you have one disk drive and want to copy a file from disk one to disk two. No sweat. Load GEOS. Put disk one in the drive. An icon representing disk one appears on the screen. Remove it and put in disk two. A disk two icon appears. Reinsert disk one and move your joystick-controlled cursor over its icon. Click the fire button twice and a window opens which displays the contents of that disk. Position the cursor over the icon of the file you want to copy. Push the fire button and hold it down. You've "grabbed" the icon! Move it on top of the disk two icon and let go of the button. GEOS springs into action and prompts you to swap the disks in the appropriate order.

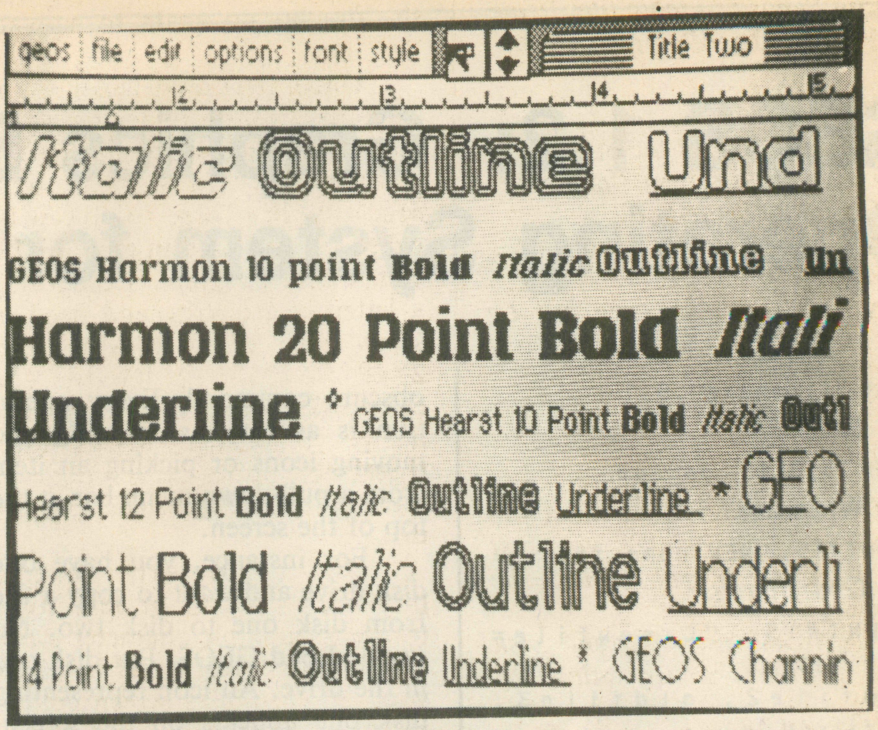
Got two drives? It's even easier. Put one disk in each drive and start moving icons. GEOS takes control and does what's needed.

Twilight Zone

To a user experienced in the manipulations of Commodore DOS, this description might seem complex (that is a hazard when you are using words to describe pictures). In any case, they can continue to use Commodore DOS.



GEOS's deskTop, here seen with a second disk drive *attatched* and *active*. The calculator is a tool you may use anywhere in GEOS.



Italic Outline Und

GEOS Harmon 10 point **Bold** *Italic* Outline Un

Harmon 20 Point Bold ***Itali***

Underline * GEOS Hearst 10 Point **Bold** *Italic* Outl

Hearst 12 Point **Bold** *Italic* Outline Underline * GEO

Point Bold *Italic* Outline Underli

14 Point **Bold** *Italic* Outline Underline * GEOS Channin

GeoWrite is a "what-you-see-is-what-you-get" word processor. Even pictures from geoPaint can be included and printed.

To a newcomer, however, icons and windows can make a lot more sense than PRINT and LOAD commands.

And this is to say nothing about the ",8". Forgetting that numerical appendage will net the newcomer "PRESS PLAY ON TAPE" and a detour through the Twilight Zone as he tries to understand why his computer thinks it's a VCR.

GEOS is loaded into the C-64 at the beginning of each session. The high-resolution monochrome display is crisp and detailed on a monitor, somewhat less appealing on a standard TV. Take note, while GEOS can work with a television, it works best with a monitor.

Thanks to a fast-load technique built into GEOS, all programs load and save faster than in a plain vanilla 1541 drive. The fast disk access is an integral part of the GEOS system, and it is needed. With GEOS, certain applications can be larger than the available memory on the C-64. GEOS uses a "virtual memory" system to swap portions of the program, or the data on which it is working, from memory to disk.

Glad you asked

Users who have been exposed to the desktop of Apple's Macintosh computer will feel right at home with GEOS. The GEOS deskTop displays directories in icon or text format. You won't have to rough it when you choose text either. With GEOS you can see disk files listed in order of name, date, type or even size. Want to know more about a file? GEOS will tell you: the name of the disk where a particular file came from, what type of file it is, its class (the permanent internal name), its structure (sequential, etc.), size, the date and time the file was last modified, the author (if it's a program, for instance) and even if that individual file is write protected. But we are getting ahead of our story.

You do, of course, have be able to type LOAD correctly at least once to get GEOS started, but, even after leaving GEOS to run a BASIC program, you can often restart it simply by pressing RESTORE.

When GEOS comes up on the screen, one of the first features you'll notice is a menu bar across the top left corner of the screen. This menu bar, or one similar to it, will be with you wherever you go in GEOS. At times, some of the features offered in it may be duplicated by icons elsewhere; but a look through it gives a good survey of services the GEOS system will perform.

Here are the five menu headings and a brief summary of the items they contain:

GEOS

GEOS Info *Version, who wrote it, etc.*

DeskTop Info

Select Printer *Many different printers are supported.*

Select Input *Joystick is only choice here — so far no mouse.*

Preference Manager *Screen colors, cursor response, cursor shape, set clock.*

Alarm clock *A deskTop accessory for on screen use.*

Photo Manager *Organizes graphic directories and files so that they can be stored or used by multiple applications.*

Text Manager *The text equivalent of Photo Manager*

Calculator *Another deskTop accessory.*

Note Pad *Every deskTop needs one, an accessory.*

File

Open *Gets you into a file and even initiates the needed application such as geosPaint fo graphics.*

Duplicate *Makes another cop of file on same disk.*

Rename *Gives file differe name.*

Info *This is where all earlier-mentioned information about write protect, author etc. came from.*

Print *Sends printable files (from geoWrite and geoPaint) to printer.*

View

By Icon *Displays the disk directory in icon form on the screen, GEOS' default method.*

By Size *Lists directory file names sorted by size.*

By Date *Same as size but by date of creation or last modification*

By Name *Alphabetized.*

Disk

Open *Causes GEOS to make the aquaintance of the disk you just put in, brings in and displays the directory.*

Close *Dismisses current disk from further consideration by GEOS.*

Rename *GEOS disks have names. This is how you change them.*

Copy *Backs up the whole disk.*

Add Drive *Enables you to have two drives on line at once without having to rewire one as a device other than number 8.*

Validate *A modest level of first aid for trouble causing disks.* **(Not the same as the DOS version which you should never use on a GEOS disk!)**

Format *This is how new GEOS disks are born.*

Special

BASIC *Exit to Commodore BASIC*

Reset *Restarts GEOS.*

Q-Link *Loads Quantum Link's dedicated telecommunications program.*

To operate these menus: place the cursor on the heading item; to pull down the sub-menu, press the joystick fire button (so far, only joysticks, track-balls and mice that behave as joysticks are supported); run the cursor down to the item you want (they flip to reverse video as you go); and press the fire button again to activate that item.

Under the GEOS heading, for example, you will find a variety of accessories such as the notepad, a mathematical calculator and an on screen clock. These tools can be called up and used in any GEOS-compatible program. Composing a letter in geoWrite and need to know how much 234985 times 2349873423 is? Open the calculator, punch in the numbers and get your answer. Adding additional accessories is as simple as moving them to your GEOS work disks.

GEOS supports several printers, a variety of text fonts (some in multiple character sizes) and has a control panel in which you can customize screen colors, joystick cursor speed and cursor shape.

Icon Action

Below this menu, GEOS displays a multi-page "tablet" on which icons representing the various items on the current disk are displayed. The pictorial part of each icon is supplemented by a text title. The pages may be turned by pointing the screen cursor at a "dog-eared" corner of the tablet and pressing the fire button.

The simplest use of these icons is to tell GEOS what you want to work with. Aim the cursor at the item and press the fire button — a process that the GEOS manual calls "clicking on". When using the "File" portion of the menu, this is how you indicate what file you want duplicated, printed or opened.

There is also a shortcut method of using the icons for such operations as opening (or loading, if you prefer) a file. Pressing the fire button twice quickly (double-clicking) on an item such as geoWrite starts the application in motion without having to open it with the menu.

Other operations are performed by "grabbing" an icon (point and click twice slowly). A "shadow" image of the icon will appear which you may "drag" about the screen with the cursor. Surrounding the tablet is a shaded area which contains a printer and a trash can. Drag the icon over the printer, and it will be printed. Drag it over the waste basket, and the file it represents will go to the big bit bucket in the sky.

To the left of the tablet is the icon that represents the disk itself, and in some cases more than one disk may be represented. Those lucky enough to have two drives can drag icons to copy files from disk to disk.

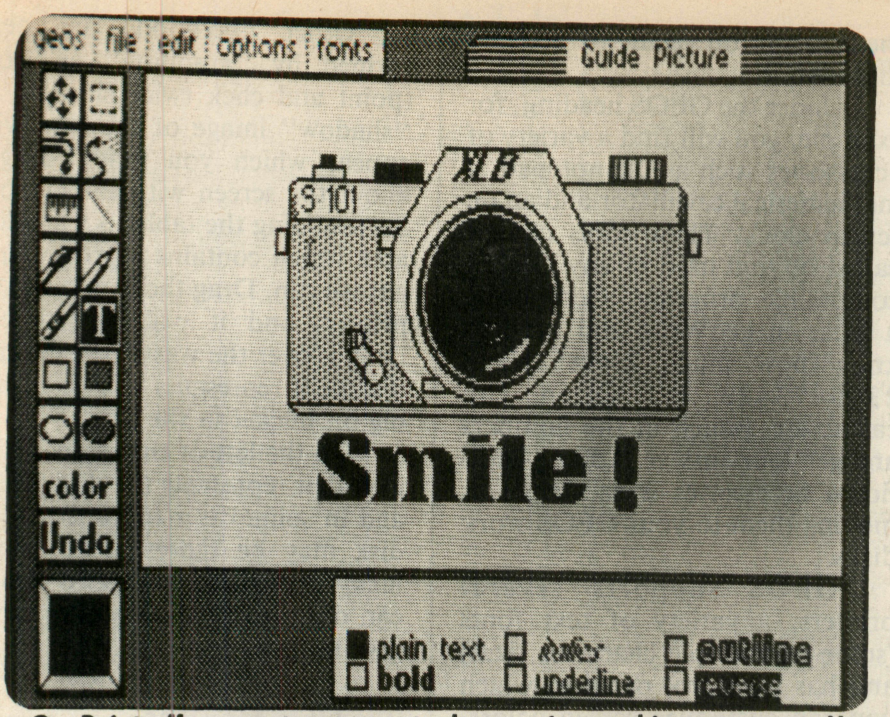
Applying Yourself

For many users, however, the best of GEOS will not be its versatile and efficient disk commands but the two programs included with the GEOS package: geoWrite and geoPaint.

Both of these also take their cue from Macintosh software. Variable fonts and type faces, a full page graphic display and other Mac-like functions are included with geoWrite. The standard cut and paste options are here. What sets geoWrite apart are those fonts and faces and the ability to stylishly print them out on several dot-matrix printers.

By using cut and paste, the user can share information with geoPaint, the other program included with GEOS 1.2. The newest version is in color (1.0 was monochrome only) and allows the user to draw and design full pages by scrolling his on screen display like a window moving across a larger display. In addition to the Commodore color palette, geoPaint has cut and paste, image copy, airbrush and several other features.

While *neither* geoWrite nor geoPaint are among the most complete Commodore word process-



GeoPaint offers most common tools seen in graphics programs. Hear the "T" or Text tool has been selected to write "Smile" on screen. You may use any of the many fonts. Note the oval looking camera lens; when printed out, it will be circular.

ing or art programs, they share the flexibility of GEOS and are impressive in their own right. For 64C owners, GEOS programs included in the package allow a purchaser to start working with his computer right out of the box without shelling out additional bucks for more software.

In order to use those applications, though, the user will have to move files from the GEOS master disk to separate work disks. The GEOS master disk is so packed with accessories, printer drivers, fonts and applications that there isn't enough room left to save a text or graphics file.

Unfortunately, Commodore has complicated that aspect of GEOS by copy-protecting the master disk. A user can move certain GEOS files to other disks but GEOS will only boot from the original. As a result, an inconvenient disk-swapping routine goes with the beginning of every GEOS session.

Compatibility between GEOS and existing C-64 programs is variable. GEOS has a deskTop icon to represent programs in the old C-64 format and will read your old disk without reformatting them. Some will load from the GEOS deskTop and some will not, depending on the use of certain memory locations. Generally, users will want to segregate old 64 files from GEOS files.

An additional advantage of GEOS is its file-handling. GEOS supports subdirectory structures as folder icons. If Commodore releases its high-capacity 3½″ drive, GEOS will be ready to provide a logical and clear-cut way of organizing those 800K capacity disks.

With the endorsement of Commodore, additional programs should be appearing that make use of the GEOS interface. With the ability to simplify DOS operations, speed-up of loads and saves, and readiness for higher capacity disk storage, GEOS represents a new wave of Commodore computing — the way of the future.

■

Geos 1.2 Counterpoint

by Bob Lindstrom

Congratulations Commodore (and Berkeley Softworks), you've done it again.

They've released a copy-protected disk operating system and, in so doing, have compromised the future of their promising GEOS 1.2 Graphic Environment Operating System for the C-64.

Suppose Microsoft had copy-protected MS-DOS? Hundreds of programs that are sold without DOS on the disk could not be auto-booted. IBM computer users could not move in and out of programs without reinserting the original DOS disk in their computers. Hard disk owners would have to start up their machines from the floppy disk and enter the hard disk only after DOS had loaded from their copy-protected floppy. The situation sounds not only unbearable but ridiculous, doesn't it?

Welcome to GEOS 1.2.

Despite the way those first four paragraphs sound, I like GEOS 1.2. Brian P. Dougherty and his colleagues at Berkeley Softworks have done a remarkable job of bringing the power and convenience of 16-bit graphic operating systems to the eight-bit Commodore 64/128. While GEOS sacrifices something to the Macintosh in disk speed and computing muscle, the icon and menu-based file handling and windows of GEOS are surprisingly elegant and functional.

That elegance will be a real advantage for new Commodore 64 owners who typically have been put off by the arcane commands of Commodore DOS. With the structure of GEOS establishing a standard, users will be able to "get into" any application that uses its menus and icons and cursor controls. Furthermore, all disk and file operations (copy, rename, duplicate, delete) are put right at

hand with GEOS. No more scanning the 1541 User's Guide to figure out how to format a disk. With GEOS, it's as close as the nearest pull-down menu.

Like any new product, GEOS has problems. In geoWrite, the use of a graphics mode to display text results in slightly sluggish screen updates. But the improvement made between GEOS 1.0 and 1.2 shows that Berkeley is right on top of the issue.

The ambitious implementation of a virtual memory system on the C-64 results in some waiting while GEOS moves program segments back and forth between RAM and the disk drive. But what's a little waiting compared to the convenience of an always-waiting calculator or notepad or "whatever." The use of GEOS accessories is limited only by the imagination of GEOS programmers.

Perhaps best of all, GEOS can bring desktop publishing to the Commodore eight-bit computers. Since geoPaint allows the creation of full pages with a resolution higher than the resolution of the Commodore 64 computer, it isn't a giant step to teaming GEOS with laser printers and thereby producing camera-ready text and graphics with the lowly C-64.

Commodore's endorsement of the GEOS operating system is an encouraging sign that the C-64 is not going to disappear into the past, eating the dust of the 16/32-bit power of the Amiga, Macintosh and Atari ST.

Geos 1.2 Counterpoint

by Grant Johnson

The operating system is the foundation on which other structures are built. Along with other elements such as the computing "horsepower" and display resolution of the hardware, it forms the personality of the computer. As an alternative operating system, GEOS will or will not make its most significant contribution to Commodore computing.

The BASIC/DOS system of the 64 was inherited from previous machines and was dated the day it appeared. It appears that Commodore thought they were designing a tape-based system that only a few advanced users would use with a disk drive; but buyers' response to inexpensive disk drives reduced that idea to curio status.

DOS's lack of sophistication (you can't even copy a file from one drive to another) made it necessary for every software developer to create his own file handling utilities, printer and modem interfaces, etc. Consequently, once you reached beyond the light-duty DOS, there were as many systems of operation as there were programmers.

Contrast that with a more fully developed system such as CP/M where applications often support the man-machine interaction in such a way as to make it seem that the application is an extention of the operating system. Even a new piece of software seems, in some part, familiar to the user. Long ago I had hoped that Commodore would extend DOS. Attempts were made but they never came to much.

GEOS is a daring attempt to leap-frog text-based operating schemes and go directly to a graphics-oriented one. As welcome as a new operating system was to me, I didn't have much hope for GEOS when I first heard about it. I thought that pictorial-metaphor operating systems made sense only for big machines with power to burn; but the people at Berkeley, with careful use of the 64's resources, caught me with my prejudices showing. They have done a remarkable piece of work.

With its powerful VIC II custom chip, the 64 has always been a strong graphics performer. The processors in those other machines had to use much of their power just to maintain a working display.

Bundling GEOS with the new 64C will increase its availability, but to be anything more than just another program, GEOS will have to be adopted by software manufacturers. Part of the value of GEOS is in its potential for a better future. Even the GEOS manual is salted with promises of improvements regarding or relating to GEOS. A manual on how to interface other programs (use the routines within GEOS for other applications) is coming soon. And, if GEOS 64 is any indication, the promised version for the 128 should be worth looking at as well.

But, as I said at the outset, hardware makes its own contribution to a machine's personality. The screen cursor is, in a system like this, the focus of your attention — an extention of your hand. A poorly-working cursor is the equivalent of a crappy keyboard. Joystick control of such a critical piece of the system is a compromise. I plugged in my old WICO trackball (which GEOS reads just fine) for some improvement, but a mouse offers unequalled scope of control. The hand–arm combination offers the gross movement to fly across the screen and the fine touch needed for non-spastic manipulation when you get there.

GEOS offers a generous range of response settings for joystick–cursor interaction, but Berkeley acknowledges they are working on a real mouse. This would silence my largest single reservation.

With better cursor control, a lot of Apple enthusiasts, without a Macintosh-sized wad of money in their pockets, are going to have their loyalties shaken by the amazingly affordable GEOS-64. *The Mac for the rest of us?*

■

Wireless Tele-Computing

Revolutionary Radio-Modem

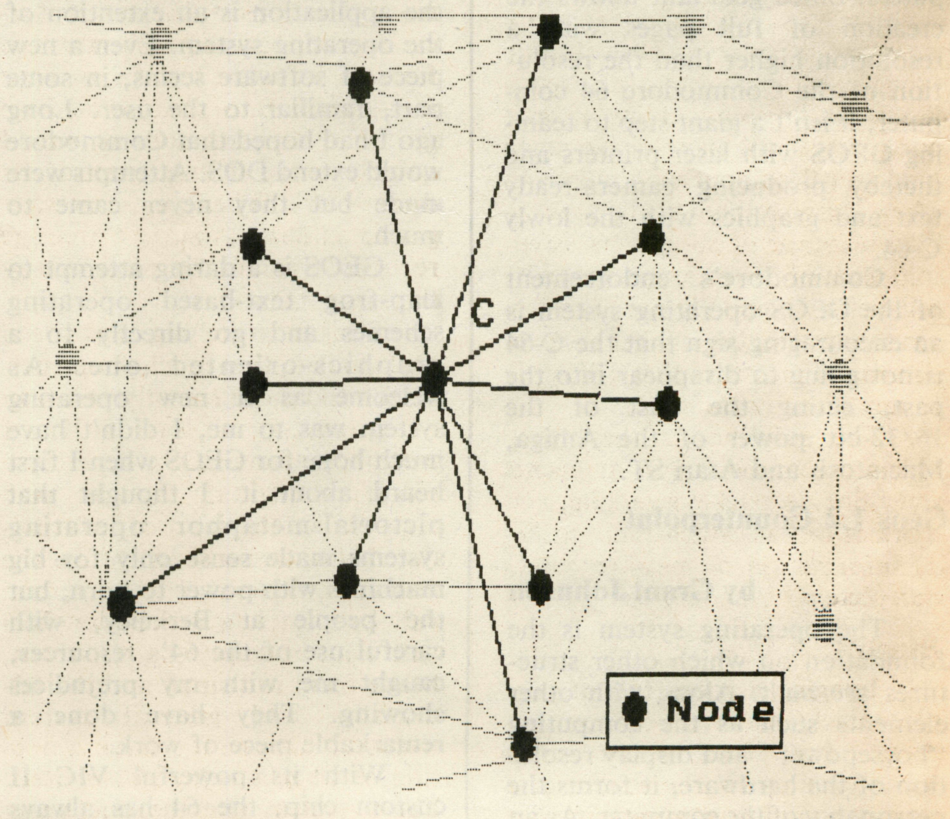
by Grant Johnson

How would you like to have 24-hour access to a telecommunications network? Any time you like you can sit down at your keyboard and send out messages. Just like a letter, you put an address on the "envelope" and drop it in the electronic slot. Unlike a letter, you don't have to buy a stamp, and you're not going to get a bill from some information service — you don't even need to own a phone! You will, however, receive confirmation of its delivery. Delivery across a major city will happen in seconds, so your reply could return almost immediately. But no need to wait around, tie up your computer or log on somewhere later to check for a reply. Messages are monitored around the clock and any addressed *to you* will be captured and held for your convenience right there in that small box next to your computer. A light on that box — like the flag on a rural mail box — will go on to say "Message waiting".

Science Fiction?

This could be yours, but you're going to have to ask for it. Let me explain. The idea started with *Donald L. Stoner, a 30-year* radio ham and computer enthusiast (Commodore 64, a favorite) from Seattle. He noticed that equipment costs for such things as computers and modems were coming down far faster than communications services. Here we are in the information age, and, without losing much sleep, you can run up a communcations bill — in one month — larger than the cost of your whole computer system. Turning away from his computer, Don could switch on his transceiver and communicate with the whole *world*; the only message charge, the electricity to run his equipment.

Don Stoner is no crackpot, and it seems his mind is a particularly fertile place for such musings. It was Don, some years back, that began to speculate publicly about the possibility of putting a transceiver aboard a satellite for



Radio modem at "C" is shown in contact with members of its Local Area Network. Other members may be in touch with other LANs.

amateur radio use. Today there are radio amateurs all over the world doing just that; even the Soviets followed this lead.

With plans for geostationary transponders in the works, amateur radio is safely in the space age. Don's more recent ideas, while down to earth, may bring even more sweeping changes.

A Modest Proposal

Don reasoned that it would be possible for computers to talk over short distances using "radio modems". The circuitry necessary to convert digital information to radio waves and back again is relatively cheap, and the technology is already on the shelf. Why not combine a modem and a radio for wireless telecommunications?

Not much real news so far, hams have been doing things like this for years, but follow it a step further. Once you have a couple computers talking to each other there is no limit to how many others could listen in. Now if these others wish to share in the "party line" and do some talking of their own, there will have to be some kind of rules about who talks and when. Also, if there are to be more than a couple of computers listening, most of the messages going by will be for somebody else. The bigger the system, the smaller the proportion of messages that will apply to any given participant.

The solution to these problems are to be found in packet switching. A packet switching network is one in which each packet of information or message comes complete with an address.

Bingo

Imagine a room full of people. Each message has an address, and, if all of the people were listening to one sender at a time, it would work something like the game of bingo. From the standpoint of an individual listener, most of the messages would be irrelevant. Also the larger the number of people, the longer you would have to wait for your turn to send.

Now imagine that the people decided only to listen to their closest ten neighbors. In a room of a hundred people, there would be ten times as much communication going on, and this would greatly reduce the length of time you would have to wait for a chance to send. But what would happen if you wanted to send a message clear across the room? The solution is for the people to agree that, if they get a message that is not for them, they will pass it on towards its destination.

You see, each person will not have exactly the same set of neighbors because they are all in slighly different positions. Want to send a message to someone on the east side of the building and you're in the west? Each time an attempt to send the message is made, the person furthest east in each group accepts the message for later transfer. Once a message is launched into your immediate group of ten, its address would quickly move it east towards its destination. When your message got to its destination, a "message received" would be returned by the same method.

Packet switching has been well studied, first in telephone networks and more recently as a way of turning a hat full of microprocessors into a supercomputer. Optimal packet size depends on the kind of information being transmitted. Make the packet too large and the system will be shuffling around packets with a lot of empty space in them. Make them too small and the addressing and general system overhead assume too large a portion of what is being transmitted. For a system like the one being proposed, 128 bytes (characters) is a likely candidate.

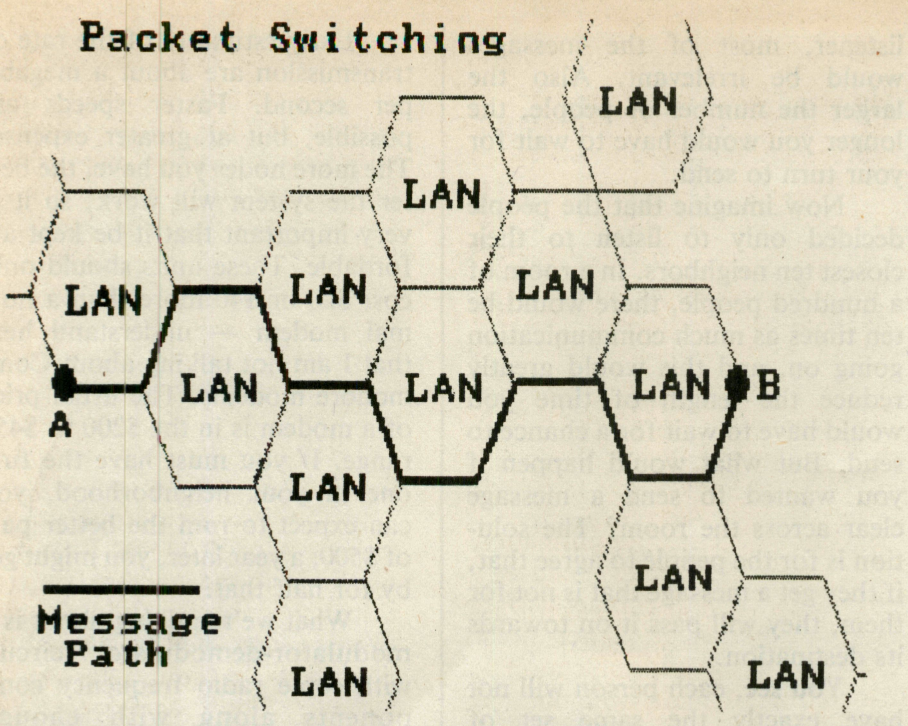
Early estimates of the rate of transmission are about a megabit per second. Faster speeds are possible, but at greater expense. The more nodes you have, the better the system will work, so it is very important that it be kept affordable. These units should only cost $20 or $40 more than a normal modem — understand here that I am not talking about Commodore modems. The usual price of a modem is in the $200 to $450 range. If you must have the first one in your neighborhood, you can expect to ruin the better part of $500; a year later, you might get by for half that.

What we're talking about is a modulator-demodulator circuit with some radio frequency components along with enough memory (128-512K?) to temporarily hold packets in transit and store incoming and outgoing messages for the owner.

Smart Nodes

Packet switching networks work because the nodes are smart enough to support the network. On the hardware level, when you first turned on your wireless modem, it would automatically explore its environment. It would reach out, first at about milliwatt, to find out who its neighbors were and adjust its power level until it had ten neighbors or reached its modest one-watt power limit. With the antenna type proposed, the reach at one watt would be about five miles on level ground. The unit would then take up its networking duties — passing on data for others and storing data addressed to it. A possible addressing scheme is already partially in place — the zip code system used by mail carriers of the two-footed variety.

Since the larger network area is divided into small cells, a single frequency could be used for the entire nation (or the world, for



Message packet from node "A" to node "B" is passed from LAN to LAN. There is no limit to the distance, only that the LANs be close enough to communicate.

that matter). Actually, the network can be seen to function on two levels. On one level, we have the local group. This forms a radio Local Area Network or LAN. With nearly immediate access to each other, the LAN members could come quite close to two-way conversations. Just remember, it would be two-way conversation of the sort that you find with radios — "Over". There would be no possibility of duplex communication, but combined with a BBS it would be terrific. You could have numerous callers without anyone ever being frustrated by a busy signal.

A small business might limit outside communication by equipping their units with small antennas. Presto, an inexpensive, wireless LAN. But that's not really in the spirit of the Public Digital Radio Service (PRDS), as it would be called.

There is no limit to the number of LANs that could be linked togeter into the overall packet switching network. The idea is that, once turned on, each unit would be left on all the time. Since operation is totally automatic these units would spend their time carring on networking duties when not actually busy with messages of their own.

While you're out mowing the lawn or watching the late show, your radio modem — let me coin a new word here, nodem — would be moving the E-mail from near and far. It leaves me with a nice feeling of community; of adding to the lives of people I may never know. Don Stoner surely has interesting ideas, doesn't he?

(The word modem is a contraction of modulator and demodulator. You might think of nodem as node-modual. There is a sonic similarity between the words nodem and modem as well as a functional simularity beween the devices they represents. In any case, I like it because it roles off the tongue easily.)

Radio Free America

Before any of this can begin, there is the problem of finding some place in the radio frequency spectrum for the service. America is a very special place when it comes to the ownership of the "air waves". In contrast to most countries, here they simply belong to the people. The Federal Communications Commission is charged with insuring that *any* use of the radio spectrum be in the interest of the public. Oh sure, politics intrude, but this fundamental rule is usually honored by the the FCC.

For example, each radio station, top-forty or long-hair, must have a license from the FCC to do business, and any citizen may call in to question whether that station is operating in the public interest. The FCC takes and investigates complaints seriously. A *single* letter can threaten a million-dollar broadcast organization with extinction.

Radio Resources

The radio frequency spectrum is a limited resource. Every bit of it that is reachable, without heroic measures, is allocated for some use, so even a single frequency for PRDS is going to displace something.

As in all things democratic, some of us are more equal than others. The "some" in this case are the amateur radio people, a.k.a. hams. These people have an extraordinary helping of the radio resources. This is not a complaint, as they have earned their privilidges by passing government tests (open to anyone who wants to try), by making responsible use of the airwaves and by providing emergency communication services in time of need. (They have also contributed considerably to expanding our understanding and use of this resource as well.)

Peons Unite!

Of the many frequencies available to them there is one which is little used. Hams know it as the "six-meter band" and, for

non-hams, it is located right next to television's channel two. Maybe it is its proximity to television transmission that makes it unpopular (it is easy to mess up your neighbors' TV with the powerful signals hams often use). In any case, there are perhaps a thousand hams in the whole country that use it with any regularity. When it comes to a limited national resource the logic of "use it or lose it" is not too unfair — particularly when there are *millions* of potential users.

Nevertheless, a privilidge lost is always felt more keenly than one never possessed, and with the explosion in things electronic, there are many proposals every year from those who want a frequency heretofore the province of hams. Given this situation, it should not be suprising if the radio amateur fraternity reacts like South American plantation owners facing land reform.

One of the key issues, in the background at least, is that of licensing. As mentioned earlier, most hams have studied hard to pass tests administered by the FCC. These test are intended to make sure that those who pass understand what they are doing with their equipment. Automated equipment, such as the nodem we're talking about here, require little or no user knowledge. In fact, the nodem is intended to be a "black box" to the user. Learning Morse code, as licensed hams must, is of no use to nodem users and constitutes an artificial barrier for "keeping the riff-raff out of amateur radio".

The Great CB Disaster

You remember Citizen's Band radio. That was the thing you spent two Saturdays banging your knuckles installing in your car only to find that when you turned it on there was at least one ratchet-jawed yokel (I.Q. two points below freezing) on every channel trying to stuff verbal graffiti in your ears. Was that the unavoidable result of allowing the unwashed masses on the air, or were there a flaws in the system that encouraged the worst? I am sure Don Stoner was as dismayed with what happened to C.B. as anyone, and its weaknesses have clearly been designed out of the proposed PRDS.

- The transmission power is self limiting: It doesn't matter how big an amplifier you try to sneak between the unit and its antenna (it needs no external amplification). The unit automatically reduces its signal until it is in contact with the proper number of other nodes. Also, no voice communication will be permitted. You will not have the users tempted to become the next National Broadcasting Company.
- There is only one channel: Anyone trying to use an adjacent frequency will find themselves wiped out by very powerful signals (such as channel two). Besides the benefits of being part of the system far outweigh any that might be gained through the lonely existence of a frequency pirate.
- All data must be sent with a specific address — "to whom it may concern" will not work. So junk mail will not be a problem. Further reducing any temptation to broadcast is the fact that receiving remuneration will be illegal.
- All data must be sent with a return address. This return address will automatically be a part of each packet and even includes the name of the company that manufactured the unit. Should intervention ever be needed for the misbehavior of someone or his equipment, not only will the authorities have the address, but the system will even confirm that the notice of violation has been received!
- Not even the big guys can mess things up; common carriers are specifically forbidden.

Progress So Far

Apparently the FCC thinks there is merit in Stoner's idea. He submitted it to the Commission in October of 1985. Now most petitions are found to be not in the public interest and go immdiately to the "round file", never to be heard of again. Not this time. They gave this petition a formal number (RM — 5241) and put it on the agenda for consideration.

It is our understanding that the Commission has made said consideration and is about to issue a "Notice of Proposed Rule Making". That means that they are thinking publicly about making some version of the proposal into law. This is equivalent to the Supreme Court agreeing to hear your case.

Next Step

Needless to say, if only one side shows up in "court", the proposal will be dropped, and there are certain elements that are sure to show. The American Radio Relay League (the AMA of hams) will be there, and although many hams see no problem with PRDS, the ARRL will probably leave no turn unstoned in their opposition. They may see it as a part of a larger issue — permitting people who have not learned Morse code to access the ham bands — something they have strongly resisted in the past.

The phone companies will be there to complain about the unfair loss of revenue they are going to suffer (do I hear violins?) These are the same people, by the way, who are trying to implement by-the-minute metering on local calls and/or slap a surcharge on modem owners in many parts of the country.

The information services, especially those that offer "E-mail" will be heard. And who knows who else.

If PRDS appeals to you, then you should be included in the "else". Now I would love to give you an address and urge you to rain bags of mail on Washington, but that would be premature. We must wait to see the actual Notice of Proposed Rule Making before it would be appropriate to comment, but this gives us a chance to get ready.

Ready . . . Set . . .

Apparently, we computer types are a gentle, easy-going, tolerant sort. We are the backbone of a billion-dollar industry, and there are millions of us. Yet, we have never organized. The fact that we all own computers is not incidental either — the Republican party, a minority, has consistenly outsripped its competitors in fundraising even though the average size of its contributions are smaller simply because they do a better job with databases and computers. I have no inclination to be an empire builder. When I read the political news, I usually just wish the world was a simpler place, but I did want to tell you that you have enormous muscle, should you choose to use it.

The first step, of course, is to stay informed. We will offer updates here in this magazine, or you may wish to be on Don Stoner's mailing list. Another step would be to get the information out to other computer owners — particularly those with modems.

Don Stoner would urge you to tell ten friends and ask them to tell ten of their friends. In his latest newsletter he even offers a short message that he feels ought to be on every BBS and telenet in the country. Perhaps he says it best himself:

From: Joe Jones
To: All users
Date: xxxxxxx
Subject: Computer Radio Band

The FCC is considering RM-5241 to create a Citizens' Band for computer communication. They may permit radio modems which would work like your present modem but operate at one megabit per second and use radio waves instead of the telephone lines. For more information, or if you want to help insure the passage of RM-5241, write Don Stoner, 6014 E. Mercer Way, Mercer Island, WA 98040. Watch this BBS for more info on how you can influence the FCC action. ■

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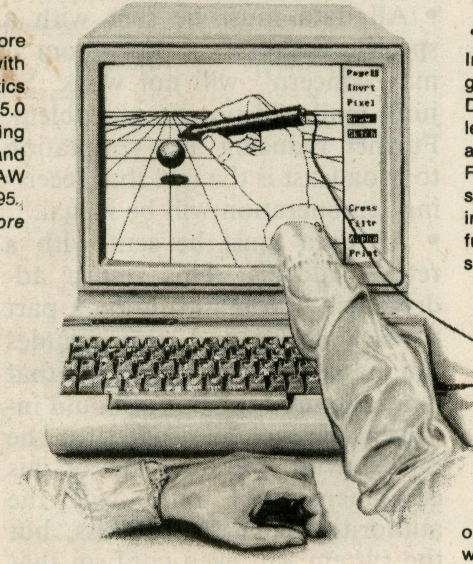

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HACKER II:

The Doomsday Papers

by Bob Lindstrom

A classic gets classier

In Activision's Hacker, you swapped trinkets and secrets with an international network of espionage agents and saved life as we know it from a low-down Down Under disaster. With the world once more safe in its bed, you retire to the mundane world of dial-up databases and bulletin boards.

But wait, there's more.

While trying to communicate with a telecommunications service, your transmission is interrupted by the government of the United States. A foreign power (we're not saying who, but they drink a lot of vodka and talk English funny) has concocted a slimy plan to destroy the US of A. Can you help? Can you break through video security and use robots to steal four documents outlining their dastardly plot? What the hell? Miami Vice isn't on 'til Friday. Sure, you'll do it.

What you're about to do is Activision's Hacker II:The Doomsday Papers, Steve Cartwright's edge-of-your-seat sequel to Hacker ($34.95, Activision, C-64/128 with disk drive).

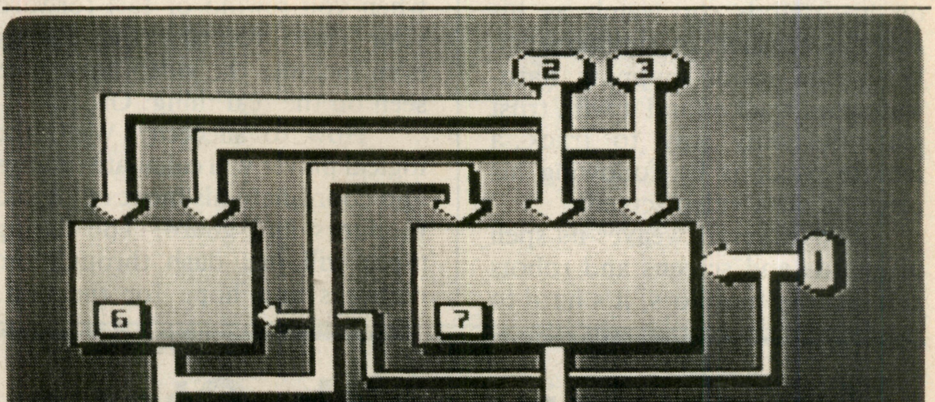
Make no mistake, network-crashers, Hacker II is better than the original. As slick as the original Hacker's tunnel-plunging graphics were, the game quickly became a puzzle-bound workout deciding who wanted what in which order. Hacker II is a security violation of a different color. Hacker II is one of the best games of 1986 and perhaps the best realtime adventure yet.

Hacker II's graphics are stunning; but it's the ingenious way Cartwright and Activision producer Brad Fregger use them that lifts Hacker II's keyboard and microcircuit above the competition.

To invade the Soviet installation from a distance, the player is equipped with a four video-screen display. And all four screens are displayed at once on the C-64!

With each screen, the player can peek in on some three dozen security cameras positioned throughout the installation. A map helps locate each camera position. Also, the player can drop in on the security monitoring system to watch as it scans from camera to camera.

Government agents have cleverly left three robots in the in-



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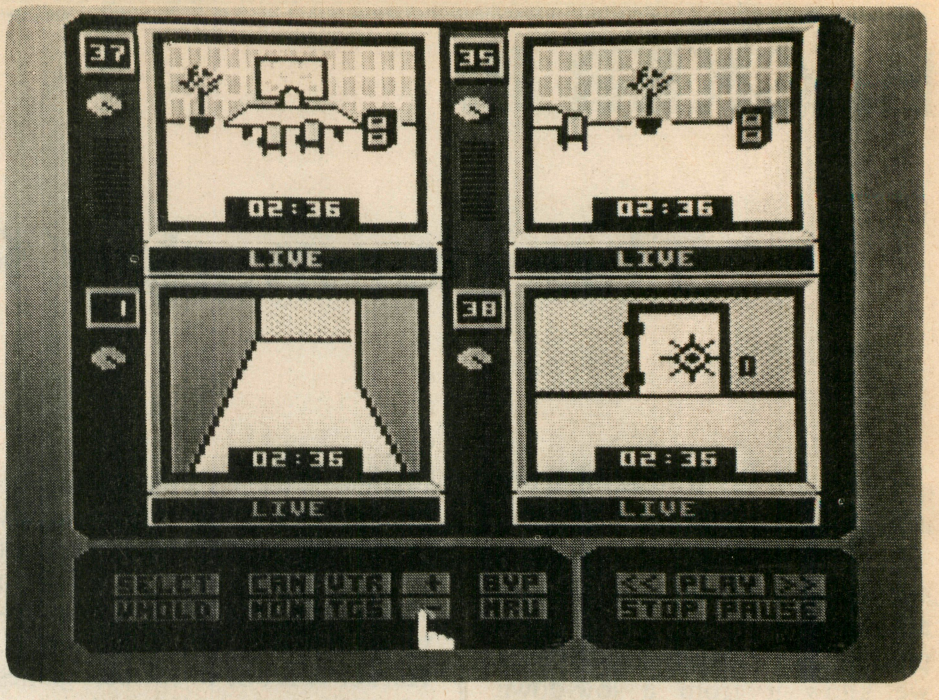
A MULTI-FUNCTION SWITCHING MATRIX
(MFSM) HAS BEEN PLANTED IN THE
BUILDING TO AID YOU IN AVOIDING
DETECTION. FAMILIARIZE YOURSELF WITH
THE CONSTRUCTION OF THE MFSM BY
IDENTIFYING SECTIONS OF THE BLOCK
DIAGRAM.
(RETURN)█
```

The intrique in Hacker is nothing if not high-tech, and even robots need stealth. Familiarization with the above diagramed MFSH will enable you delay detection.

stallation. The player can move them throughout the rooms and hallways in search of four safes containing the coveted Doomsday documents. Find the safes, get them open, dig up the documents and Earth breathes a sigh of relief. But don't let a robot get spotted by the security system. And don't get caught by the guard who wanders through the hallways on a regular schedule. They'll activate an anti-invader device that will smash your robot down to salvage value.

Avoiding the guard is just a matter of being sneaky and out of sight. To avoid the security camera monitor, the player can jam the video circuits by overriding the camera with a videotape replay of an empty room or hallway.



With thirty-eight cameras to work with, it is a lucky thing Hacker's main control panel has four monitors. But before you use them you must first activate them and adjust the virtical hold.

The graphics, sound and controls of Hacker II credibly suggest a real life experience. By learning the camera locations and switching from one to another, the player visually can track the guard on his rounds (or watch as his robot is crushed to smithereens). When the robot mapping hardware goes wacko (and it will, trust me), the only way to track a remote robot is by following his progress on a video screen.

As Hacker II weaves its spell of guards and screens and robots and security monitors, it's hard to believe that you aren't snooping around a real security installation somewhere in the USSR. In fact, to take visual detail to an extreme, when you rewind or fast-forward your video recorder the display even includes the video noise bars seen on the real thing. Great.

How to succeed? Well, the logical player will calculate timings and coordinate his moves to avoid monitors and guard. The daring types will just dash through the hallways and hope for the best. Both plans might work. In Hacker II, there's more than one way to skin a cathode ray tube.

Dedicated gamers will dig deeply into the challenge and the texture of Hacker II. Programming fans will marvel at the number-crunching that puts so much intricate imagery on the Commodore 64 screen. Any way you break into Hacker II, it's a breakthrough piece of entertainment software. ■

Interview with Steve Cartwright

by Bob Lindstrom

With Hacker, his first computer game, programmer and game designer Steve Cartwright burst full-blown onto the computer game scene after creating such hit Atari video cartridges as Activision's Stampede. The Guide talked to Cartwright about the genesis of Hacker and Hacker II as well as his technique of game design and programming.

The Guide: When did you begin work on the original Hacker?

Steve Cartwright: That was almost two years ago when Activision was making the transition from a video game company to a computer company. Previous to that I had done only fast action, shoot-em-up video games. They were making a change and I was kind of on the ropes myself. I also had to make the transition because people were not going for those "Blast the aliens" games.

TG: What inspired the *security-breaking* concept of Hacker?

SC: That was my first attempt at a computer game. The idea for a game develops over the course of its design, a period of nine months. There was a lot in the news about kids breaking into other computer systems. That kind of thing didn't fascinate me, but I could understand their interest. Here at work I have all the computers I need. I don't need to break into anybody else's.

I start all my games with the idea for a display. Here, I wanted to display moving through tunnels, so the first thing I did was try and come up with a display that would simulate that. When that was done, I went on to the next thing.

OK, I said, now that I was going through tunnels what can I do? Suppose I go around the world? Then I came up with different scenes for different countries. Then I wondered, why would I want to be doing this? You get the idea. I was thinking only one step at a time.

TG: Is that design-as-you-go technique customary for game designers?

SC: There are a couple different ways to design a game. You can sit down and design the entire game at once. Ghostbusters — that was a case where David Crane sat down and in one week planned out the entire game. Since he was able to assign various tasks to different people, he had five to six people working on it at once. Then he assembled the pieces.

I sit down and start plugging away with no overall goal in mind.

TG: When Hacker came out did anyone object to the fact that the player was violating computer security as part of the plot?

SC: In the beginning, some people said you can't do this. This game promotes breaking into other computers. But, that isn't it. In Hacker, you stumble into someone else's system and you're actually doing some good because the computer is run by a bad company. When people actually played the game, they realized what it was.

TG: To go back to the future, what was the origin of Hacker II? Did Activision's marketing department ask for a sequel?

SC: Hacker II was developed over a period of four to five months. I had an idea for a type of display which had to do with controlling various TV monitors. Once I had that up and working, I said, gee, I could set it up so the game is played entirely through the computer.

It was then that the marketing department was consulted. They didn't want to put out a sequel. If it was just Hacker One with a different map or plot, they said don't bother.

Hacker II was really designed as a separate game. It just happened that it could be called Hacker II because it was a simulation.

I began just by drawing pictures on a Koala Pad. That's how I developed the original artwork .... Since this was more or less only my second Commodore game, a lot of time was spent writing the code that displayed the pictures. Somebody suggested picture roll. If you had a TV set maybe you could have a videotape recorder that went with it. I just kept adding to it and it kept getting more sophisticated.

TG: Hacker II packs a lot of detail into the Commodore 64. Was it difficult programming the game?

SC: Instead of designing a game, it was more like designing a piece of equipment that performed all those functions. I come from the programming base of the Atari VCS. The Commodore uses the same processor, so I was pretty familiar with 6502 code.

Back in the days of Atari, everything we did was so time critical. You didn't just have graphics on the screen. You had to write the code that put them there. So, we all got very good at time-critical code.

TG: How did you achieve the realism of Hacker II? When playing the game, you really get a sense of looking around a real security installation.

SC: One of the reasons it seems so realistic is because of the man who produced that product: Brad Fregger. Fregger kind of oversees what some of the designers do.

Brad is the kind of guy who will go to a movie; everybody will think it's a great movie. Brad will say, 'That movie was great, except that one scene didn't make sense.' It ruins the movie for him.

He looks at games and says it all fits except for this or that. Brad will point out all the inconsistencies of a product. In fact, it was his idea for the plot of Hacker II. We had decided to call it Hacker II two to four months into the development. It was Brad's idea for the storyline that tied it into the original.

TG: Do you have any tips for players on how to win at Hacker II?

SC: I never actually played it myself. For me, I used to like to play the shoot-'em-ups. I like to build in all the intricate details. Once I know the solution, I don't get any enjoyment from playing it.

TG: But you know what's in there. Can't you just give us a hint?

SC: Well, the playtesters make a list of the times when cameras change through different hallways and when the guard makes turns. That way they can move without worrying about whether they'll get caught.

A good player can actually finish the game in 11 or 12 minutes. Of course, it took them months of practice to get to *that* point.

■

High-Rise Memory Expands the 128

by Grant Johnson

Now in the stores are two new add-on products from Commodore for 128 PC owners. The 1700 and 1750 RAM (Random Access Memory) Expansion Modules are plug-in cartridges, about the size of Commodore's modems, but are to be inserted into the expansion port. According to Commodore's literature, the 1700 "Increases your RAM by 128K bytes" and the 1750 " ... by 512K bytes". At first glance, it might appear that you can make your 128 into a 256K- or 640K-machine with a quick flick of the wrist (after the necessary cash outlay). That cash outlay is not insignificant; retail at the stores we checked is about $130.00 for the 1700 and $200.00 for the 1750.

These cartridges certainly have the advertised RAM in them, but it cannot be used in the same way as the system RAM that comes within the machine. In understanding just how this memory can be used, it is helpful to look at how it fits into the scheme of things at the hardware level.

The Fast Action

With the exception of some input and output functions such as video display, the fast action in a computer happens in and near the central processor chip. Like a man with two hands, the processor must have a place to put the objects it is not at the moment working on. Numbers, for instance, are added two at a time. The sum of only three numbers requires that at least one of the numbers be stored someplace awaiting its turn.

The most immediate storage places are the registers in the processor itself. This memory is very, very fast. The processor in the 128 can take a number out of one of these registers and put it in another in no less than two millionths of a second. Unfortunately, there are only three byte-sized registers in the 64 and 128 that can be used for anything like general purposes.

Next in order of proximity and speed is system memory. System memory is the RAM and assorted ROM (Read Only Memory) that is directly addressable by the processor. In the case of the 128, the address register is sixteen bits (or two bytes) in size, and the largest address number that can be placed in such a register is 65,535 or 64K. This memory is fast as well. The processor can grab a byte of data from anywhere within this address space in six millionths of a second.

Still within the machine but requireing the flip of a switch (the Memory Management Unit) is a second bank of 64K. The operation of the MMU is small overhead to pay for the advantage of doubling fast memory resources, but 128K is as far as it goes within the current machine. (There is no engineering reason that the MMU couldn't be used to address a megabyte of system RAM, but this would either increase the base price of the machine or confuse customers with multiple prices. It would require that the machine be sized large enough for a full compliment of memory and would make life miserable for manufacturer, retailers and software developers. Apparently that was the reasoning that prevailed at Commodore, though I know there were differences of opinion.)

Looking Outside

Most common of the memory resources outside the computer proper are the magnetic storage devices such as disk drives. While the drive is, in some cases, built into the body of the computer and may in fact be the relatively fast "hard" disk, it is still a giant step

Simply plug the 1700 or 1750 RAM Expansion Cartridge into the expansion port of the 128, and your installation is complete.

to place in a computer, DMA is the fastest thing since bank switching. In terms of actual transfers, nothing is faster. The central processor uses much the same method with system memory. In fact the RAM expansion contains a large scale chip — called the RAM Expansion Controller (REC) — that, when called on, literally takes over the system buss (the lines of communication that connect all of the major components within the computer) and accesses system memory directly.

The central processor must suspend operation while the expansion is moving information, but it is so fast, you'll hardly notice it. How fast is that? The transfer rate is *one million* characters per second — a megabyte. That is well more than 3000 times the speed of the 1541. You have to "want it yesterday" to be unhappy with that.

BASIC Basics

Probably the easiest way to understand how the expansions can be used is through some examples in BASIC. Before you can get anthing out of expansion memory, you must first put something there. Let's say that you have an image on the screen (perhaps a main menu) that you wish to save and use later. You could simply take the information from screen memory (locations 1024 through 2024) and stash it in the RAM expansion. BASIC 7.0 has three commands that support the expanded memory, and, not suprisingly, the one needed here is STASH. The format of this command is:

STASH *length*, *internal-address*, *expansion-address*, *bank-number*

To carry out this command, the computer will need to know much the same information that you use in mailing a letter. It needs to know where the data is coming from, and where it is going to. In the case of storing screen memory, you will only want to store 1000 bytes of information, and the starting address in internal memory is 1024. The adderessing in the expansion memory is exactly the same as for the first 64K of internal memory except that there are at least two banks. Each of these is addressed from zero to 65,535 (64K). To keep things simple, let's start storing our data in location zero of bank zero.

```
STASH 1000, 1024, 0, 0
```

Later, a second screen image could be stored with:

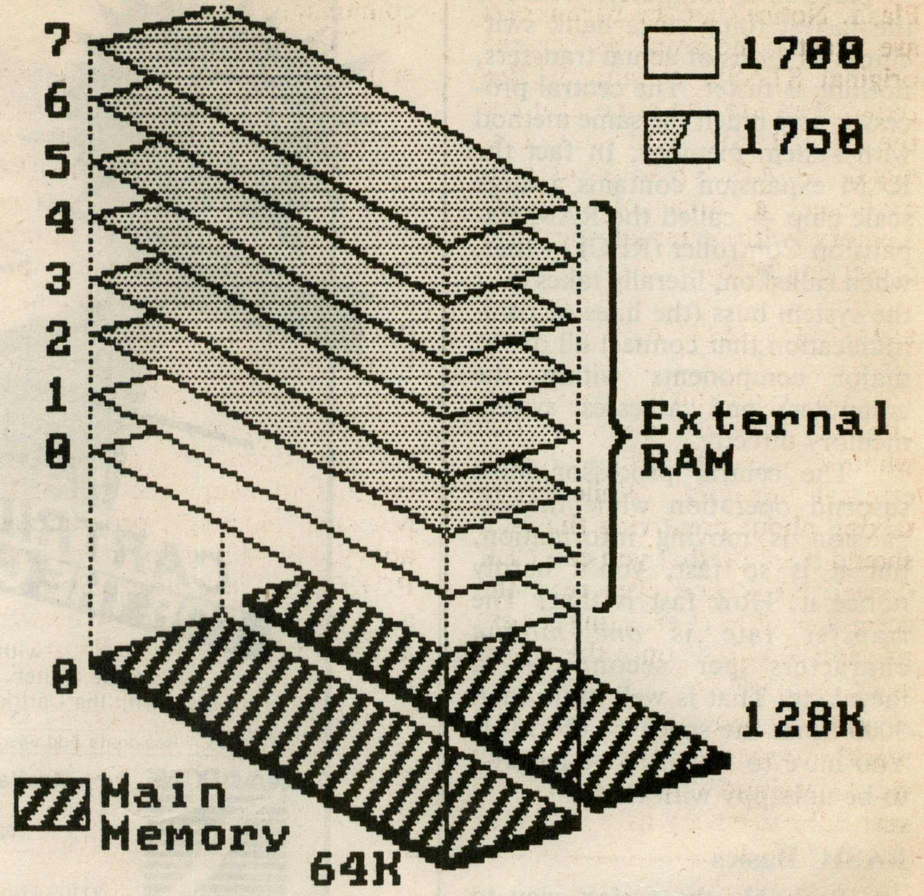
```
STASH 1000, 1024, 1025, 0
```

This stores the second screen image starting at the next available location (1025) of bank zero in expansion memory. Notice that you do have to know the actual numeric addresses. If you can handle the actual address numbers, it is all rather simple, really. You may, of course, use variables as long as they evaluate to the actual addresses. [See 128 Memory Map by Chris Scott, pages 52–66, in the June 1986 *Guide* for help with where things are.]

Time to re-display the first menu screen?

```
FETCH 1000, 1024, 0, 0
```

This single FETCH instruction will return it to the screen in a



The two added memory banks of the 1700 (in white) and the eight banks of the 1750 (white plus grey) are shown suspended above the first 64K of internal memory of the 128.

slower. Even in the 1571's burst mode, information dribbles into the computer when compared to system memory. This reduction in speed is overlooked by most users because of magnetic memory's other qualities: it is cheap, portable, permanent and, if you are willing to swap disks, virtually unlimited in capacity.

What we have then is a nearly all or nothing situation. Either we figure out how to get everything we need into the computer's system memory, or the computer is forced to drum its electronic fingers while waiting for events in the mechanical world to get around to supplying it with the data it needs. And even when the magnetic blips have been translated to eletronic form, it passes a bit at a time through a serial port from the drive to the computer.

The Problem

There are programs which require that information be brought in from the disk during normal operation. I am not talking here of the start-up, program-load operations or the input of a word processing document, but about text adventures that spin the disk every time you give a response or spreadsheets that pull code off the disk each time you change from one routine operation to another. The larger system memory of the 128 can make quite a difference in such situations, (Multiplan for the 128 does no swapping), but as the sophistication of the software catches up to the hardware in the 128, code swapping is bound to develop.

Indeed, *it already has* for CP/M users. Yet even if you buy the notion that CP/M is a "dead" language, the word is finally getting out that the 128 is a very capable machine. The 128 runs many programs (Multiplan, for one) faster than an IBM PC, and is positively in Ferarri territory when compared to the Apple IIe.

The problem is that constant disk access injures the vitality of adventures and taxes the productivity of more practical applications. Even if your needs are not time-critical, this situation ties up a drive that you might otherwise put to good use.

The Solution

Imagine a large store of electronic memory stacked like a high-rise on the edge of the great gulf between fast internal memory and distant disk drives. That is the RAM expansion.

It has some of the characteristics of both system memory and disk memory. Like disk memory, the information it contains cannot be used where it is by the processor, but must first be brought into system memory. Like system memory, it is all electronic — no need to wait a minor ice age for disk rotation and head tracking to coincide.

As with system memory, the expansion memory is divided into banks (not the same BANKs you find in 7.0 BASIC). These banks are 64K in size. There are two of them in the 1700 and eight of them in the 1750.

DMA

Unlike disk memory, information is transferred through Direct Memory Access (DMA). If you must transfer data from place

few thousandths of a second. Flash. Notice that the parameters are exactly the same as for the original STASH command. The parameters are the same also for the third BASIC expansion command, SWAP. SWAP is used to exchange a area of internal memory with external memory, preserving both.

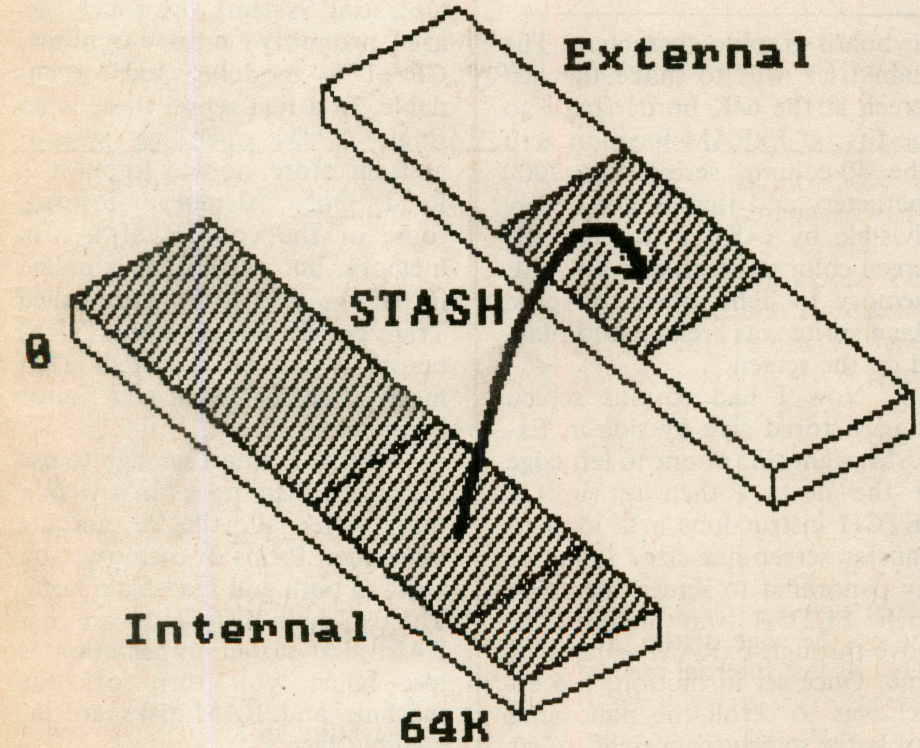
```
SWAP 1000, 1024, 0, 0
```

This command would exchange screen memory for whatever was previously written in external memory. While we're talking about preserving things, I should mention that you can CLR (clear), NEW and even reset the computer without effecting the expansion RAM — only the power switch will kill it.

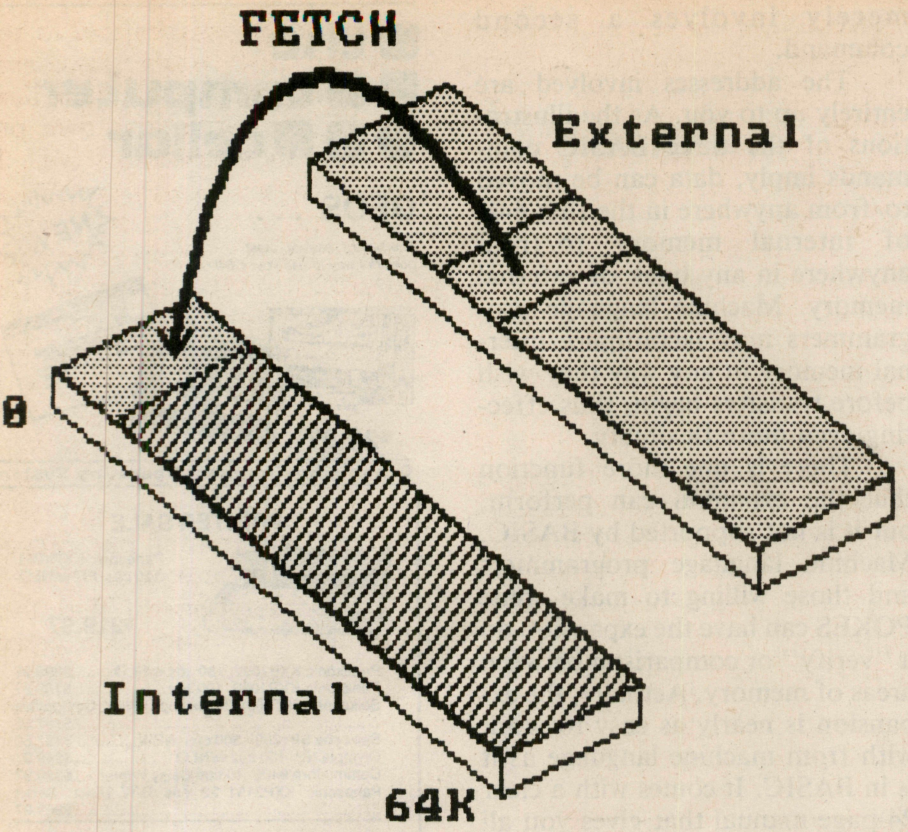
Of course in a practical world, saving a screen image would ordinarily require that you save color memory as well, which merely involves a second command.

The addresses involved aré entirely up to you. As the illustrations of the three BASIC commands imply, data can be moved to/from anywhere in the first 64K of internal memory to/from anywhere in any bank of external memory. Machine language programmers may reconfigure internal memory in any way they wish before transfers begin, thus effecting even more flexibility.

There is one more function that the expanion can perform, but it is not supported by BASIC. Machine language programmers and those willing to make some POKES can have the expansion do a "verify" or comparison between areas of memory. Actually, the expansion is nearly as easy to work with from machine language as it is in BASIC. It comes with a clear 24-page manual that gives you all the info you need.



BASIC STASH command copies contents of any area of the internal memory to external storage in the RAM disk expansion.



BASIC's FETCH command copies any area of external memory (RAM disk) to any area of the first 64K of internal memory.

Useful?

I have a reputation for being a "serious" computer user, and it is true that I earned my living programming the things back when "personal computer" meant the machine access you could have at 2:30 am when all the sane people had gone home. It isn't so much that I don't like games and adventures, but that other things seem to interest me more. Yet even I can see the potential for purely recreational uses of the RAM expansions.

I have already mentioned the immediacy of adventure games that respond instantly, but consider the strange (for me) case of Grant's "Defender" game. What I did was to STASH a series of screen images in external RAM — let me call it ExRAM for brevity. The screen consisted of a sort of stylized terrain made up of keyboard graphic characters. The main trick was to make the last screen at the 64K border mate to the first at ExRAM location zero (the 40-column screen has 1000 characters and that is not evenly divisible by 64K). I then set the screen color to black and all color memory to light green. A space plane sprite was created and placed on the screen.

Now I had 65-plus screen images stored side by side in ExRAM, right side of one to left edge of the next. I then set up 25 FETCH instructions in a loop to transfer screen-line-sized strips of my panorama to screen memory. Each FETCH was indexed to move through ExRAM a step at a time. Once set in motion, the effect was to scroll the panorama across the screen from right to left like the rotating backdrop that Max Sennet used as his characters chased each other on a treadmill stage.

My sprite character was conrolled by reading the joystick port. Up and down motions did just that to the sprite, and faster/slower (right/left) effected the index of the FETCH instructions. Crude, but easy and fun. It's amazing how indulgent life is when you have memory to burn.

RAM-Disk

Of more lasting interest to me is the use of ExRAM as a an electronic fast disk (usually called a RAM-disk). There is no support for this use yet in BASIC 7.0, but Commodore says it is on the way (is that what the empty socket is for in the 128?). RAM-disk functions are supported in CP/M, and the RAM expansion even comes with a RAM-disk ready version of CP/M in case you have an earlier version.

CP/M's operating system was never intended to fit into memory all at once. Unlike the BASIC operating system or DOS (Disk Operating System) with which you are probably more familiar, CP/M is modular and expandable. In a real sense, there is no single CP/M operating system, and, therefore, no way to put it in Read Only Memory. Instead, some of the code is always in memory, but much of it is pulled in off the disk to an area called Transient Program Area (TPA) before it can be executed. That means that the "great gulf" must be crossed.

CP/M is smart enough to use the added memory as if it were a disk. After all, they're nothing more than forms of memory; you write to both and read from both. The two main differences are that RAM-disk stored information is lost when you turn off the machine and RAM-disks are incredibly fast.

For a typical CP/M session the operating system is copied to the RAM-disk — device 'M' (for

memory). For example:

```
A> PIP M:=A:*.*
```

This command (Peripheral Interchange Program) quickly copies everything from the disk device "A" to device "M". If you are using the 1750 with its 512K capacity, this should work no matter how full your disks are, but you will have to trim down the data on the system disk for the 128K 1700. I have a CP/M disk from which I removed the help files (this has not always seemed a good idea), and it fits nicely. Just remember there is a possible 160K on a single-sided CP/M disk.

Once inside the machine, the pace of your CP/M efforts pick up considerably. Instead of waiting for a command to be loaded from disk, it jumps into the TPA from RAM-disk in the blink of an eye. It appears to have been ready and waiting the whole time. Meanwhile your actual disk drive is free for other work. And with the seemingly immense 1750 you can use a that single drive to copy an entire disk in two steps:

1) PIP it into device "M".
2) Swap disks and PIP it back out to device 'A'.

I just love having multiple drives to work with — particularly with the heavily disk-oriented CP/M, but I have only one 1571 drive. Now that I have tried one, I think I might prefer a RAM expansion to a second 1571 for CP/M work. That is, if *both* wasn't one of my choices.

Conclusion

I simply have not been able to come to terms with the cost of Commodore's memory expansions. The REC is a custom chip, and that is expensive. But the rest of the components that go into these are good quality but not exotic. I don't want to be hard-hearted about this — Apple owners would have stormed the stores to get a similar unit for their machines, but this is the company that brought us the under-$100-modem. The 1750 is definitely the better value with four times the memory at only 35% more cost.

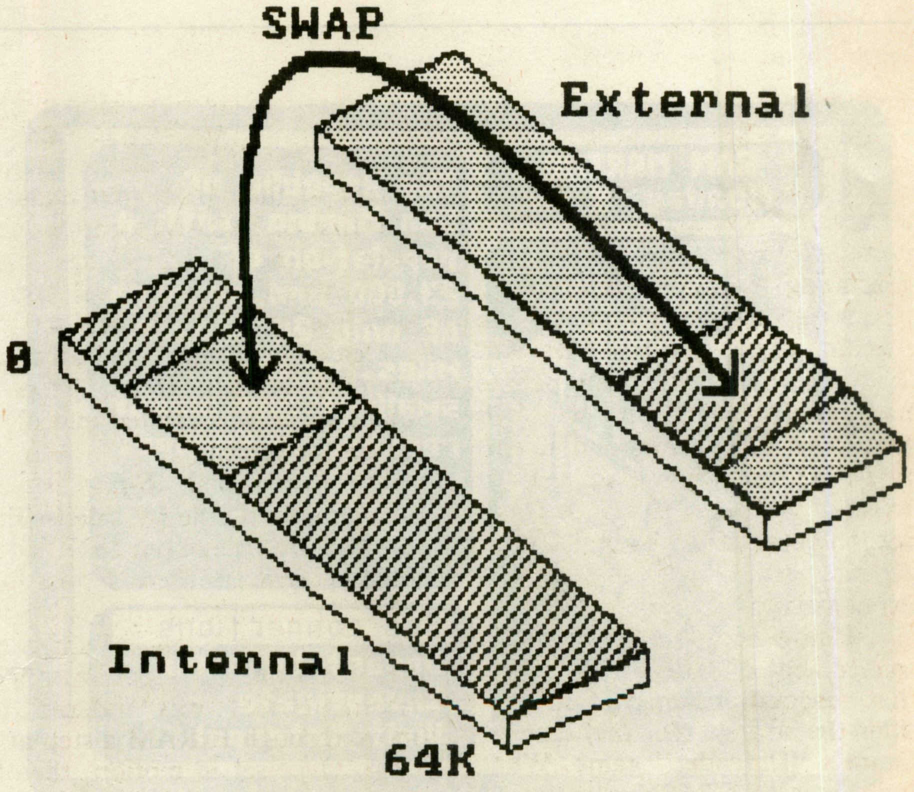
If I seem awkward about the price it may be that the only things out of place were my expectations. You may have to look at the price a couple of times and try one out before you finally decide. If you pass for now, you will probably have to re-think your decision when Commodore comes through with DOS support for the expansions, and the 128 version of GEOS is going to make you think ever harder.

If you go for the 1750, don't even think about plugging anything else into the expansion port along with it. The 128's power supply was designed to handle the 1750, but Commodore's engineers say that that's the limit.

If you write your own programs, the expansions will be found to have many uses. To get the most out of them, however, you're going to learn more about BASIC's BANK command than you ever thought you wanted to know. Machine language programmers will, likewise, want to learn a good deal about the MMU.

Those that use (non-CP/M) commercial software will see no reason to own a 1700 or 1750 at present. I know of no software that can make use of it.

CP/M types will find these the best news since axle grease. CP/M sessions change from a sedate hesitation-step waltz with a 1571 into a lively romp. ■



The powerful SWAP command exchanges any like-sized area of the first 64K of internal memory with any area of external memory. Even SWAPing a full 64K takes only fractions of a second.

Who In The World Is Carmen Sandiego? (And Where Did I Lay That Almanac?)

byRandy Chase

Who in the world is Carmen Sandeigo, and why should you care *where* she is? The lady in question is a former spy, and the leader of a most daring collection of international art thieves. You should care because chasing her and her band of cohorts around the world is an enjoyable and educational experience that you'll enjoy almost as much as your children.

Armed with the World Alamanac and Book of Facts, which Broderbund provides with the game, **Where In The World Is Carmen San Diego?** sends the player on an international chase through 30 different cities and countries. Usually one step behind the suspect, the key to the game is in deciphering the clues and determining just which criminal it is that you're chasing, and just where in the world they've gone.

For example, in Paris the clues you gather may be that the suspect was iterested in finding books on the italian langauge, was hoping to buy ceramics on her trip, and was last seen boarding a plane with a blue, white and green flag. At that point in time, you compare the possilbe connecting flights from Paris with the clues, and after some browsing in the Almanac you discover that ceramics are one of the major industries in San Marino, and they *do* speak italian. A quick check of the color pictures of international flags in the Almanac confirms that you next stop is indeed San Marino.

The Republic of San Marino, with a population of 23,000 and an area of only 24 square miles, is the smallest and oldest republic in Europe.

International persuit of Carmen Sandiego leads to one of the smallest countries in the world.

As you travel the world (and the Almanac), you will also be provided with tidbits of information about the suspect you are persuing. Perhaps the doorman at the hotel will comment that she was carrying a tennis racket, or had red hair. Someone else will mention the kind of vechile driven by the suspect. These scraps of information, when fed into the Interpol computer will provide you with a list of suspects. When enough such clues are gathered to positively identify the criminal, a warrant will be issued. Should you be unfortunate enought o catch up with the suspect without a warrant, they will get away.

Each case must be resolved *with in a week* (in game time), and accordingly won't stretch the at-


BANGKOK
Wednesday, 3 pm

Thailand is about the size of Texas and is bordered by Burma, Laos, Cambodia and Malaysia. This nation used to be called Siam.

Packed with informative and educational trivia, Carmen Sandiego also offers graphic displays for each city the trail passes through.

tention span of a younger gamer. Each individual case moves quickly to its resolution; and for long term appeal the player tries to solve a series of cases in order to be promoted to a higher rating, which in turn brings harder clues and more complext cases.

Sound simple? It is. It's an excellently designed educational package. Easy to play, but with enough combinations (and increasing difficulty levels) to keep it fresh. This is one the whole family can enjoy, together or alone. The graphics are both entertaining, and informative, adding not only to the appeal of the game but also to its overall educational appeal. The graphics were done by Lauren Elliott and Gene Portwood. Portwood was an animator for the Disney studios in the 50's, contributing to such classics as Sleeping Beauty.

Everyone involved with this project is to be commended for taking the concept of educational software to a whole new level of enjoyment. This truly makes learning fun. It's a delight to see a piece of software that while entertaining will also teach the user how to use a reference tool such as the World Almanac. Along the way, it will hopefully even open their eyes to the treasure of knowledge that lies waiting in the libraries of the world.

This classic, which has just been released for the Commodore, already has a sequel in the works. **Where In The United States Is Carmen Sandiego?** promises better graphics, more animation and an even bigger library of clues. It will also offer the ability to save a case in progress, to be resumed at a later time. This will prove extremely useful in a classroom setting.

If you're looking for a refreshing alternative to the usual diet of space-aged action games that seem to evolve around rampant destruction of every life form that strays across the screen, you can't go wrong with Carmen Sandiego. Not only will it provide you children with a very intriquing and informative package, but it also is a great family game. Gather everyone around the 64, whet you thumb, and prepare to journey around the world and through the Almanac.

By the way, does anyone know what country uses forints as currency? I'm on the trail of Lady Agatha Wayland, and she was last seen exchanging her English pounds for forints and was talking about grapes. Anyone got any idea what plane I should be taking if I want to follow her?

Where In The World Is Carmen Sandiego
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Real Gamers Don't Read Instructions

by Robert J. Sodaro

In this column I would like to talk about one of the newest companies on the scene, Accolade. Their first two products were **Law of the West** and **Hardball**.

Hardball is more than "just another" baseball game. To call it such is to sell it far short of its true potential. First, the graphics of this product are startling. To my mind, it features the finest set of graphics ever seen in a ballgame scenario. The players move smoothly, without the jerkiness that we've come to expect in this type of game.

As the team manager, you have the option to choose how you would like to play, (against the computer or another player), and whether to play using American or National League rules. You also get the ability to pick subs, and can be either the home or visiting team.

As the game begins you are greeted by a view of home plate from behind the pitcher's mound. Then (depending on whether you are the home or visiting team) you will control either the pitcher or the batter.

As pitcher, you can burn up to six different pitches across the plate: fast balls, sliders, curve balls, screwballs, changeups, and sinkers — any of which may be thrown high, low, inside, or outside.

As the batter, you can swing away, high, low, or bunt. You can also call a hit-and-run play by having a man on base steal.

Once the ball is hit, the view changes to follow the ball, as it would in a televised game, with your joystick controlling the runner or fielder. All activity — baserunning, picking up the ball, throwing to the bases — is accessed by toggling the joystick forward, backward, left or right.

The game progresses through nine innings of play (more, in the event of a tie). If you have opted for substitutions you will be able to send in relief pitchers as necessary.

A bird's-eye view of the field is displayed in the lower right portion of the screen throughout the game so you can overview the action no matter what else is occurring. Also at the bottom of the screen are the pitching and batting options available, as well as a scoreboard. The 3–D field offers a perspective unique to the genre. I'm not a big fan of baseball games, but I did enjoy this one.

Next is **The Law of the West,** by far my favorite of the lot. This one is a straight-out shoot-'em-up (SEU) with the twist of also being a low-grade text adventure. This curious cross-blending of genres makes for riotous gameplay.

The view served up by this game is from behind and slightly to the right of the sheriff. We see his gun, slung low, his right hand inches from the trigger. Beyond the sheriff is the town. Various scenes are called up throughout the game: the saloon, the depot, Bank, etc. Into each of these settings stroll the deputy, the local sawbones, a young child, the schoolmarm, and other denizens of the old west.

Each person approaches the sheriff and speak to him. "You the sheriff of this stinking town?" "Like my new shotgun Sheriff?" "I see you killed again."

As sheriff, you then must choose from five possible responses. The way you respond to these hailings will determine the individual's next comment, to which you must again reply. This banter will continue until you either assist the stranger, talk them out of shooting you, or actually engage in gunplay.

Interestingly enough, the object of this game is *not* to kill all the villains, rather novel for a shoot 'em up. It is your task to *preserve* the law. (Remember, before we hung the handle "cop" on them, they were once referred to as *peace* officers.) It is only when your dialogue fails to dissuade your protagonist from a show of arms that you must resort to violence.

You are scored on how many crooks you kill and/or capture, the number of times you uphold the law, and your, ah . . . romantic interludes. Counting against you are the number of innocent

civilians you kill, and the number of robberies. At sundown (or your death) your score appears, rating how well you fared in each category.

Being the roguish sort of fellow I am, I determined that I would outwit this silly piece of software by gunning down anyone and everyone who walked into my sights. The result was a constant message that flashed about my being a mite trigger-happy. While I did win the game (I survived), my endgame score was very low — 67, as opposed to over a couple of thousand when I ''played fair''. I then attempted several different strategies, first antagonising, then placating each individual, with varying results.

Therefore, if you wish to have an intelligent discourse with people prior to gunning them down, this is the game for you. I give it my highest rating. (While I was being silly, it gave me quite a few enriching laughs. Any game that amuses me, and can increase my silliness quotient gets a triple-A rating in my book.)

Next up is Accolade's **Fight Night**. Like other boxing games, this one allows you to get into a ring and pummel your opponent in three action-packed rounds. More than merely teaching you the manly art of fisticuffs, this program allows you to build and train your fighters. You can pick everything from the color of his trunks to the color of his skin. (Want to see a purple fighter pound a green one? Go right ahead — it's a gas.) You can use one of the prefabricated fighters or save your fighter to disk and call him back at a later time.

Your training sessions consist of your entering that mode and selecting both the speed and type (lead or follow) of pattern of rights or lefts with your joystick. This is done by viewing an on-screen pattern with the joystick. You may then practice your rhythm and timing which, once perfected, will help you become more acclimated to being in the ring.

Once trained, you can choose to enter the ring and spar with a ''live'' boxer. Again, when you feel confident enough, you can choose to box in an actual bout. If you care to go beyond just simply boxing, you can even stage a double-elimination tournament.

Here again, we see the skill and ingenuity of the Accolade programmers. This game comes up to the standards of the others, and will provide many hours of enjoyment, even if boxing isn't your ''Main Event''.

Moving into an area of high adventure, **The Dam Busters** depicts bombing runs made by the RAF over Hitler's powerdams. These dams, located in the Ruhr Valley, were successfully destroyed on May 16, 1943; it is your task to recreate history.

First, you have to train the crew of your vintage Lancaster Bomber in a flight simulation mode. Aces of previous flight simulators should whizz through this part of the game. You play all five members, switching from one to the other with your joystick. When you feel confident with your flying ability, you can then choose to play an actual game. In actual play, all the flying is done at night with spectacular graphics and super effects.

You, as the navigator, locate your target on a map. Then you must fly through enemy ack-ack fire to make it to the dam, switch to bombadier and reduce the third Reich's power dams to so much rubble. These runs require you to pay close attention to altimeter readings, flight speed, compass direction, and distance. Then, of course, there is always the deadly Red Baron who attempts to shoot you down.

As military simulations go, this one's a beauty. It serves up everything particular to this genre. The action, excitement, and feeling of flight are top-notch and should be a real come-on to action aces who want to be top gun bombers as well.

Last up is **Psi 5 Trading Co.**, an inter-stellar game that has you captaining a transport cruiser loaded with supplies. Your task is to move this cargo safely from your home port to an outpost on the periphery. Here, you don't play your five-man crew (as in **Dam Busters**), rather you pick them from a group of extra-terrestrials. Prior to each flight, you run through the files of several ET's to determine whether or not you would like them to crew with you. In each potential crew member's jacket will be listed his particular strengths, weaknesses, schooling/training, and the like.

Once you pick your destination and crew, you take off for the stars. As you pilot through space you will be able to communicate with each of the crewmembers. As you call up each crew member their image will appear on the visicom and you transmit instructions, and receive feedback from them. Along your route you encounter many hazards — some natural (meteor storms) and some man(?)made (pirates).

Should you become attacked, you have blasters, cannons, missiles, and thermal weapons to defend your ship and cargo. Still, it is important to remember that your cargo is perishable. Even if you hold off your attackers, your cargo could spoil. (When your are involved in a firefight, I would suggest letting your gunner fire at will at approaching attackers, since his timing and aim are probably better than yours.)

Five games, five hits, with **Law of the West** leading the pack! I would keep my eyes on Accolade. Next time, I'll be scoping in on Activision, so stay tuned, stay bright, and we'll talk again in 30. Ciao.

■

Sports Corner

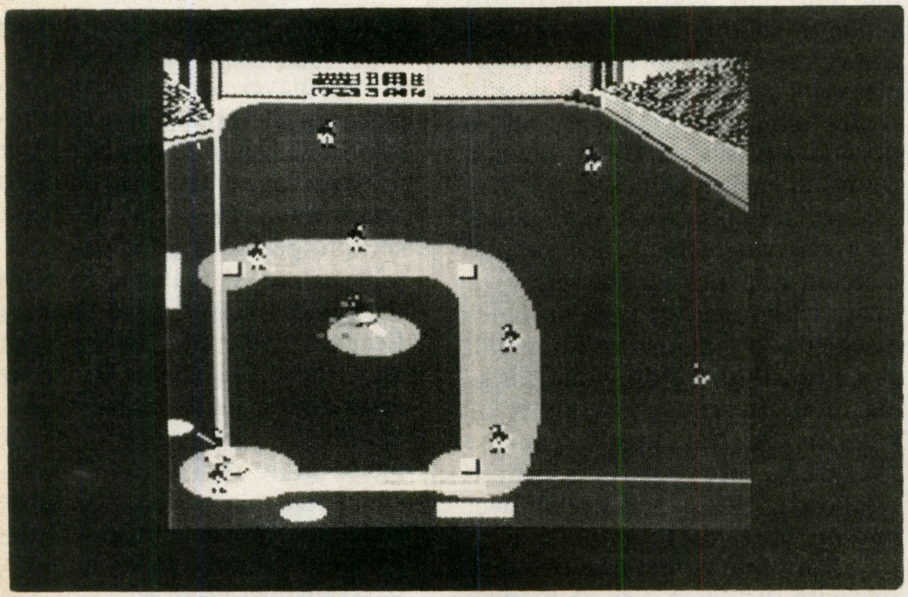
SubLogic's Pure-Stat Baseball Closer to the Ultimate Game

by Randy Chase

My first experience with a baseball simulation was a simple card game I bought when I was about seven years old at the local five and dime (for you younger readers, that was the closest my generation came to a Toys 'R' Us). It was a very crude affair, a deck of cards, each with an at bat result on it. We'd get out our Topps bubblegum cards, pick our teams, and then work our way through this magical deck of cards.

Next came several mechanical baseball games. Remember those affairs with the remote controlled bat and the little ball with a magnet on it? If you hit it hard enough, and just right, it would stick to the wall of the stadium. The higher up the wall the bigger the hit. Again, very crude, but they did provide the action required to maintain the interest of a nine year old.

Then one day my cousin showed me his Strat-O-Matic baseball game, and the world was never the same again. What a revelation it was to suddenly discover that you could manage Mickey Mantle and Roger Maris and Whitey Ford, and *even* have them perform just like they did on television. While I have since explored almost every table-top baseball game to be released over the last twenty years, I always seemed to go back to S-O-M, primarily because of the combination of its ease of play and its consistant statistical accuracy.

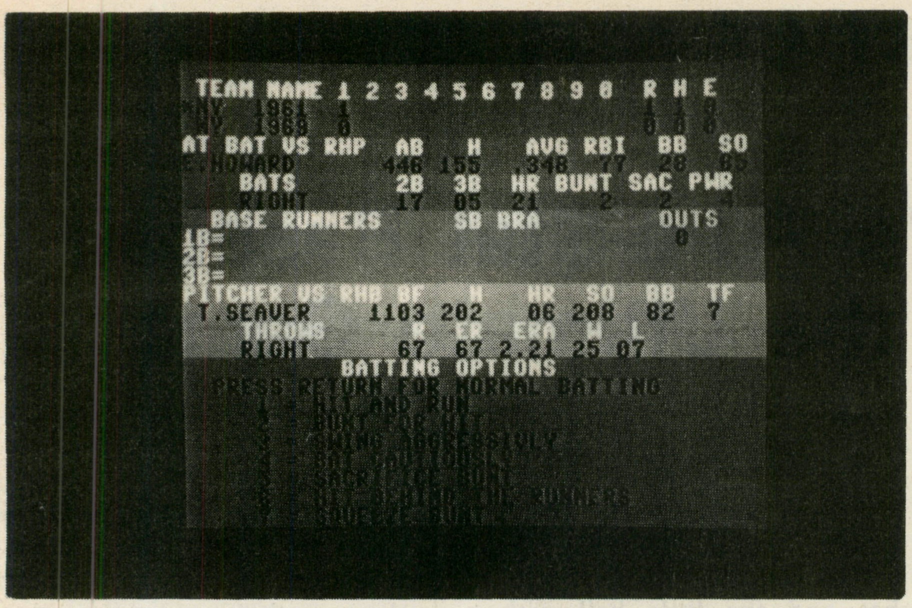


Pure-Stat Baseball combines very good graphics with suberb statistical simulation. An option disk even provides all major league ball parks, such as Boston's Fenway Park shown in the above picture.

I was still in high school when the concept of having a computer keep track of all of those notebooks of statistics I kept compiling first occured to me. Computers in those days where large and mystical affairs that existed off in some dark corner of the government, but even so, it seemed the perfect application for this new science fiction technology.

When Quest announced the release of thier latest sporting simulation, **Pure-Stat Baseball**, I couldn't wait for its arrival. Having spent hours with their **Superbowl Sunday**, and being familiar with **Sublogic Football** and Epyx's **World's Greatest Baseball Game,** this promised to be an intriguing addition to my ever-growing collection of sports titles.

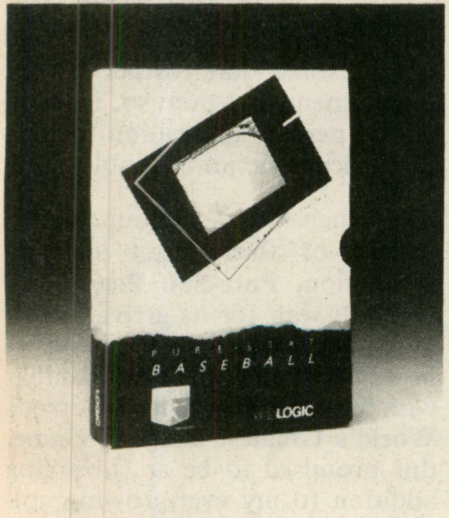
True to their reputation, their newest title for SubLogic will be a



```
TEAM NAME 1 2 3 4 5 6 7 8 9 0  R H E
*NY  1961 1                    1 1 0
 NY  1969 0                    0 0 0
AT BAT VS RHP  AB   H   AVG RBI  BB  SO
E.HOWARD      446 155  .348  77  28  65
   BATS        2B  3B  HR BUNT SAC PWR
   RIGHT       17  05  21    2   2   4
  BASE RUNNERS    SB BRA          OUTS
1B=                                 0
2B=
3B=
PITCHER VS RHB BF   H   HR  SO   BB  TF
 T.SEAVER     1103 202  06 208  82  7
    THROWS       R  ER  ERA  W  L
    RIGHT       67  67 2.21 25 07
          BATTING OPTIONS
  PRESS RETURN FOR NORMAL BATTING
     1 = HIT AND RUN
     2 = BUNT FOR HIT
     3 = SWING AGGRESSIVELY
     4 = BAT CAUTIOUSLY
     5 = SACRIFICE BUNT
     6 = HIT BEHIND THE RUNNERS
     7 = SQUEEZE BUNT
```

Behind the entertaining graphics, Pure-Stat provides a wealth of statistical information and managerial options.

must for the serious baseball fan. Combining entertaining graphics and a very realistic simulation of major league baseball, Pure-Stat takes the avid gamer one step closer to the ultimate baseball simulation. For the impatient player who tires quickly of the graphics, a toggle key is provided to disable the graphics, and another key will trigger the game into a *quick* mode.



PURE-STAT BASEBALL for the Commodore 64 128 from SubLOGIC

Perhaps the biggest single advancement offered by Pure-Stat is the auto-play feature which will suddenly allow the time-pressed gamer the ability to actually complete full-season replays. Not only is the computer manager miles beyond any silicon Casey Stengal found in earlier games, but Pure-Stat will also play a series of games between two teams, and compile all team statistics for the series. In the quick mode, with the graphics disabled, a regulation baseball game can flash before your blinking eyes in only a couple of minutes. A full season can be squeezed into two or three weekends, rather than stretch over two or three years.

Pure-Stat comes as a two disk set, with the game disk containing eight great teams, including the 1927 Yankees and the the 1955 Dodgers, and three different ball parks. The second disk contains all of the teams for the 1985 season, and a third supplemental disk is available with the 26 major league ball parks. Pure Stat not only takes into account unique dimensions and attributes of the various ball parks, but also graphically depicts them. They also plan to have some of the old historic ball parks available in the future, such as Ebbetts Field in Brooklyn.

Quest provides a wide and realistic arsenal of strategic moves for the managers. Allowing for two player, one player versus the computer, and the auto-play mode, in all cases the range of options available provides a very realistic and entertaining simulation. Breakthroughs by Pure-Stat include ratings for both pitchers and batters based on their performance against right- and left-handed opponents, the ability to run aggressively against a weaker outfielder but remain cautious against those with stronger arms, and the ability of the computer manager to realistically platoon his players according to pitching changes as the game progresses.

Offensive and defensive options are selected either through the keyboard, or via a joystick. In a two-player game, the joystick provides the ability to make your selections without revealing them to your opponent. On both offense and defense, the players seem to perform within the acceptable curve of realism. In testing the game, I played a full American League replay of the '85 season and found the results to be both entertaining and realistic. In a month or two, after I've completed more replays and have accumulated a larger base of data on which to draw conclusions, I'll offer a more thorough evaluation of the statistical accuracy.

The most remarkable aspect of the replay is that I completed it in less than a week! For the average gamer, full season replays

have always been a source of frustration. Who really has time to play the 1,000-plus games involved, and who really wants to plod through all of those games between Cleveland and Oakland? Pure-Stat provides a perfect solution: play the games and matchups that interest you, and let the computer churn through all of those *other* games necessary to complete the season. It even provides the option (as they also did in Superbowl Sunday) of interrupting the auto-play and over-riding the computer manager.

Pure-Stat's ability to accurately compile the team and individual statistics as the season progresses is second to none. This is the first game I've yet to encounter that can accurately award a save to the appropriate relief pitcher. Provisions are also made for allowing trades between teams, or creating new teams and "drafting" the players from the existing teams into these new empty rosters.

The on-screen display of relevant statistical information on the players is excellent. Not only are the season stats for the batter and pitcher displayed, but they are also provided for their relative performance against both right- and left-handers. Box scores can also be printed out, not only at the end of a game, but also at any point during the game. A series total can also be printed out at the end of a series of games between two teams.

Is this the *ultimate* baseball game? No, fans, it's not. But it certainly is a very major league step closer to that dream.

New Amiga Releases

Also warranting mention this month is the release of the Lance Haffner titles for the Amiga. Both college and pro basketball and the 3-in-1 Football (incorporating NCAA, NFL and USFL into one package) have been released in Amiga versions. If you aren't familiar with these, they are truly worth the attention of the serious sports gamer. While they are devoid of any colorful graphics, they are some of the most accurate and enjoyable sports simulations on the market.

I would caution gamers, however, to be aware that these titles are written in BASIC. On the other machines they have been compiled, but with the lack of a compiler for the Amiga, they do tend to run slower than one would like. The football game seems to run at a reasonable pace, but I was disappointed to discover that both basketball games run slower on the Amiga than on my 64 in their compiled versions. If you don't have a 64, these games are worth owning for your Amiga. If, however, you do have another system, the basketball games are more satisfying in their earlier versions.

Haffner has also announced that his new baseball simulation, Full Count Baseball will be shipping just prior to the World Series this fall, and will contain the full set of teams for the 1986 season. You can be sure I'll be telling you all about it as soon as it's available.

Pure-Stat Baseball
1985 American League Replay

East Division

Team	Won	Lost	Pct.	GB
Detroit	99	63	.607	—
Toronto	98	64	.605	– 1
Baltimore	91	71	.562	– 8
Boston	84	78	.519	–15
Cleveland	84	78	.519	–15
Milwaukee	75	87	.463	–24
New York	74	88	.457	–25

West Division

Team	Won	Lost	Pct.	GB
Kansas City	86	76	.531	—
Texas	80	82	.494	– 6
Seattle	80	82	.494	– 6
Chicago	79	83	.488	– 7
California	78	84	.481	– 8
Minnesota	68	94	.420	–18
Oakland	58	104	.358	–28

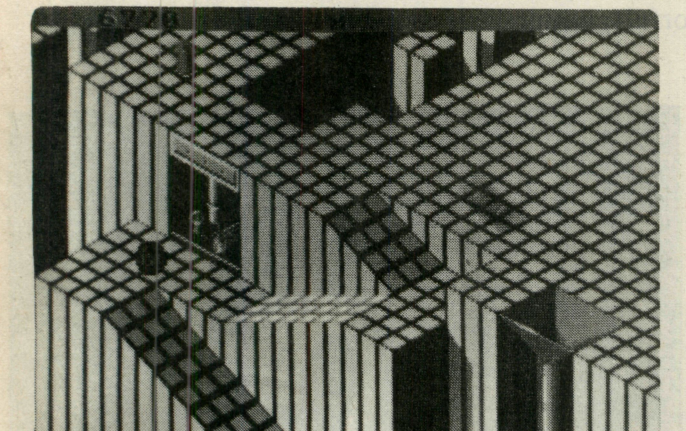
Short Takes, Quickies & Nutshell Reviews

Marble Madness

— Amiga
$49.95
Electronic Arts

There's no need for waffling here. Marble Madness is the best arcade game ever programmed on a personal computer. The play value, the graphics, the stereo sound and the outstanding joystick control make this one an unqualified hit. In fact, serious game players will have a tough time ignoring the Amiga after resting an eyeball on Marble Madness.

According to the packaging (and substantiated by reports I've been getting from EA for several months), Marble Madness ruled the Electronic Arts offices when the stand-up arcade version was released by Atari. Little wonder, it's a terrifically entertaining game. The player controls a little ball that weaves its way through a twisting maze of drawbridges, platforms, ramps and glaciers. Along the way, the ball is endangered by marble-eating slugs (ick!), dreaded black marbles that try to bump you into an abyss, and marble-sucking vacuum cleaners.



The graphics of the original were outstanding. Light glistened off the glacier. Pneumatic machinery hoisted the drawbridge. Sunlight cast shadows across the towering walls of the maze. The Amiga version makes no compromises. The graphics here are just as awesome as the original. Programmer Larry Reed has become the first to really show what the Amiga can do for arcade imagery; not to mention an original musical score that adds audible excitement IN STEREO!.

EA effectively has converted the rollerball controls of the original to a joystick control. However, the program also has options to support an analog or digital rollerball when those are readily available for the Amiga.

As is, Marble Madness would be the hottest arcade game around. What cinches it is a great two-player mode in which each player has a marble on screen at the same time. Want to lose a friend? Roll over and bump your opponent off the maze, or crowd him into the slimy jaws of a slug.

At my house, even friends who couldn't care less about arcade games quickly have become addicted to Marble Madness. This is *the* microcomputer arcade game of 1986.

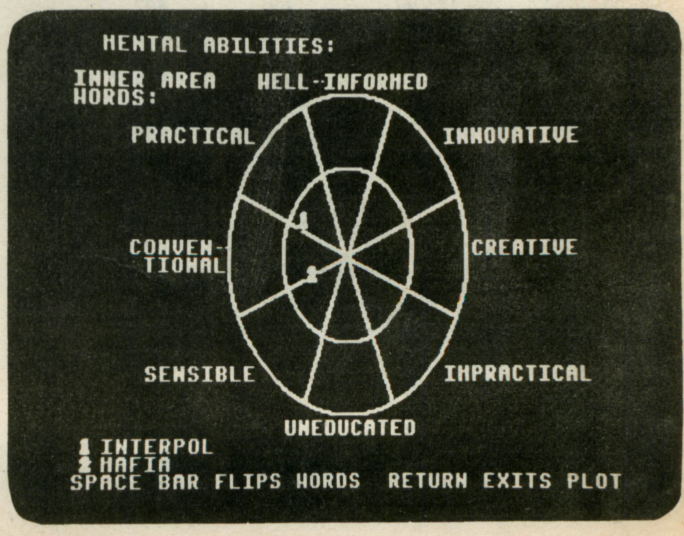
Bob Lindstrom

Mind Mirror

— C-64/128 with disk drive
$32.95
Electronic Arts

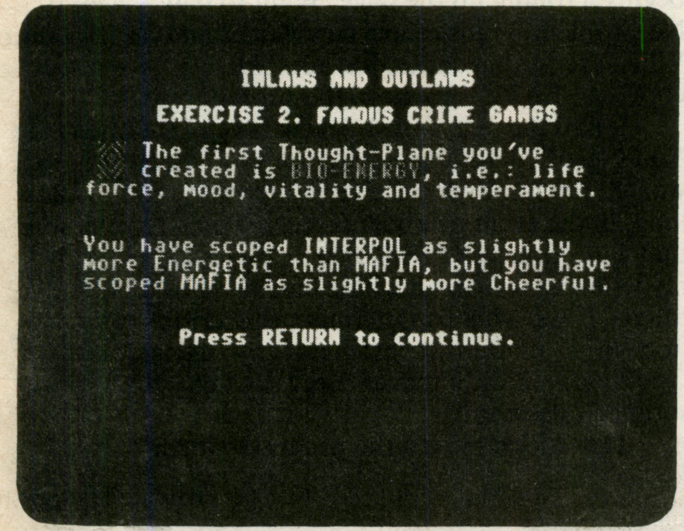
After years of slashing ogres and hunting dragons on personal computers, suddenly real life is in vogue. Activision broke the reality barrier with Alter Ego and now here comes that philosphical guru of the 1960's, Dr. Timothy Leary, with another program that explores the wonder of "Life And You," Mind Mirror.

Mind Mirror brings together some elements of Mind Prober and some of Alter Ego in its two main modules.



The first module allows you to compare two or more individuals' personalities á la Mind Prober. You are presented with keywords — informed, extrovert, energetic — and asked to rate each subject on a scale from Never to Always. The program evaluates the responses and charts the comparative outcomes. The program includes some provocative options — compare your best love to your spouse, for instance — that makes this part of the program much more fun than it sounds.

You can then take one of those personalities, or another one entirely, and enter the second module which allows you to play that individual in a variety of situations ranging from the crib to a Playtime key club bash. Though this smacks a bit of Alter Ego, Leary's wry wit is considerably more entertaining than Peter Favaro's cute and conservative humor.



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              INLAWS AND OUTLAWS
       EXERCISE 2. FAMOUS CRIME GANGS

     The first Thought-Plane you've
     created is BIO-ENERGY, i.e.: life
force, mood, vitality and temperament.


You have scoped INTERPOL as slightly
more Energetic than MAFIA, but you have
scoped MAFIA as slightly more Cheerful.

          Press RETURN to continue.
```

Mind Mirror may have some serious applications. Two executives faced with hiring a new assistant could each enter and save their personality descriptions of the person they want for the position and the program would chart a comparison between their two points of view.

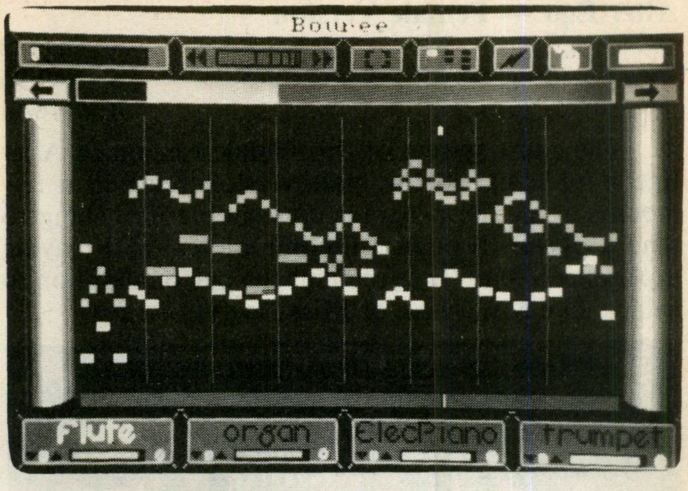
Overall, though, Mind Mirror is just for fun. No more probing than some of the other psychological programs on the market (even though it can really jog your image of yourself) and a lot more entertaining than most.

Bob Lindstrom

Instant Music

— Amiga 512K
$39.95
Electronic Arts

Just as the Amiga allowed the supercharging of card and banner-printing programs, Instant Music fires up the new technology to boost this play-along music program. Impressive though the music capabilities of the C-64's SID chip are, programs such as Dancing Feats weren't much more than diversions and pretty short-term diversions at that.



At the heart of Instant Music is the same concept: use your mouse to play along with a set of nearly four dozen built-in songs while the program helps you void sour notes and other ear-punishing mistakes. Like those earlier programs, Instant Music does not use conventional musical notation. Instead, colored bars suggest the various pitches of four instruments. You can choose an instrument and "paint" a part for it or you can go into mouse jam mode and use the mouse to play along in real time.

That's where the C-64 play-along programs ended. But the gig is just beginning for Instant Music. Take your pick of 19 different digitized instrumental sounds from marimba to strings. (The Do Voice, a digitized version of someone singing "doo," sounds like the Swingle Singers' drugs are peaking.) And any of those instruments can play chords up to three voices, subject to the limits of the Amiga's four channel output.

Using the colored bars as a guide, you can compose your own songs of varying lengths, select pitch and rhythm guides to avoid those sour notes while improvising, create drum patterns, quickdraw note patterns with a "rubber band line" feature, change tempo, cut and paste sections of songs, and so on and on. The emphasis here is on fun, but programmer Bob Campbell didn't skimp on features either. What's more, when EA's anxiously-awaited Deluxe Music (Amiga's Music Construction Set) appears, Instant Music owners will be able to transfer their music files to Deluxe Music, display them in conventional musical notation and print them out.

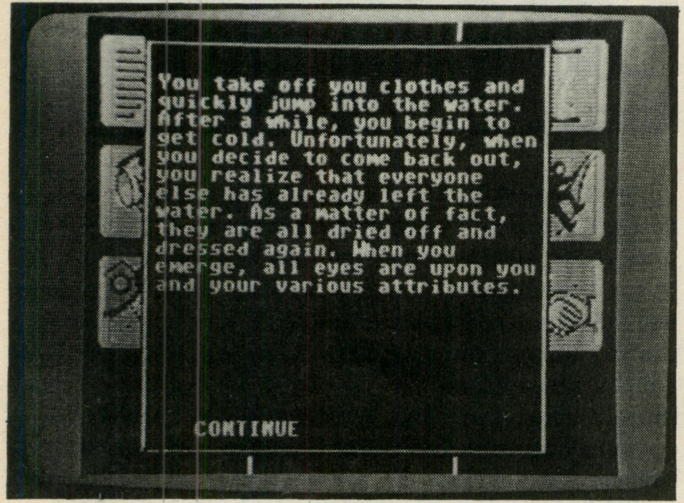
Instant Music is play-along music brought up to date and then some. Even serious musicians, who will find Instant Music more amusing than useful, are likely to lose some sleep fooling around with this one.

Bob Lindstrom

Alter Ego — Female Version

— C-64/128
$49.95
Activision

The game system of this female version of Alter Ego is identical to the male version released a few months ago. The program uses simple branching to send a player through a lifetime of real role-playing experiences. And there remains the personal option to behave like Ms. Sweet or Miss Nasty.



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You take off you clothes and
quickly jump into the water.
After a while, you begin to
get cold. Unfortunately, when
you decide to come back out,
you realize that everyone
else has already left the
water. As a matter of fact,
they are all dried off and
dressed again. When you
emerge, all eyes are upon you
and your various attributes.




    CONTINUE
```

Dr. Peter J. Favaro's still witty texts, however, now arrive with a lady's emphasis. You get asked out on dates instead of doing the asking. Different kinds of professional opportunities present themselves. And life's problems tend to be wrapped up in all the female dilemmas that Joan Rivers talks about in her Tonight Show monologues.

This female Alter Ego is as much fun as the male version, for men as well as women. However, like the first version, the game tends to become repetitive after several playings. It's a good buy for a family; every member can play through and get their money's worth out of the software.

And watch out, moral conservatives, there still are those sexually-oriented passages (that none of us hit RUN/STOP to avoid).

Bob Lindstrom

Financial Cookbook

— C-64
$39.95
Electronic Arts

Yeah, I *know* Financial Cookbook is a couple of years old. Yeah, I *know* it's an Apple "port-over". Yeah, I *know* it doesn't have graphics, doesn't use a mouse, and won't even let the user change the color of the screen. So why am I taking up space talking about it? Because it is one of the ten best programs ever written for the Commodore. Period.

Did *you* know that? Well it is. Sez me. And, if you're a fairly new Commodore user who hasn't yet had a chance to see this Electronic Arts release, you're missing something.

Financial Cookbook is unbelievably easy to use. The user is presented with a menu of 32 different financial scenarios of practical use to most people. These include items such as Yearly Mortgage Schedule, Deposit Needed For Future Purchase, Refinancing Your Home, Energy Saving Devices, and even Fixing Your Car, which helps you determine if you should fix your old car or buy a new one.

Choose any item from the menu, then just enter the few variables the scenario asks for and select "COMPUTE". Within seconds, the information begins scrolling up the page. Want to play "what if"? No problem — just enter new values and do it again. When everything clicks, just hit "PRINT" for a hardcopy or "SAVE" to store the profile to disk.

I used the item called "How Much Life Insurance You Need". I told the program how much money I wanted my family to receive each month, and for how long, in the event of my unfortunate demise. I learned that I need around $180,000 in coverage to provide my wife and son an adequate income until his 21st birthday. I was able to determine this critical information in a matter of moments by using Financial Cookbook. I didn't even need to talk to a life insurance salesman.

That alone makes the program worth buying.

Michael Daigle

ARCTIC FOX

— Amiga
$39.95
Electronic Arts

What a disappointment! This arcade game was written specifically for the Amiga. It was not written for other computers and then converted for the Amiga. Therefore, I expected something that would take advantage of the fantastic abilities of the Amiga. But I was let down. The game had great possibilities, but they have not been realized. I really wanted to like this game, but found it nearly unplayable!

Arctic Fox is a souped-up version of Battlezone. You are inside a tank, looking out the window at the landscape. You move about avoiding obstacles and shooting at ground vehicles and flying machines. The program has very nice stereo sound. The graphics are really great. They are detailed, and use the many colors to advantage. That's the good news. Now the bad news.

The animation and game-play are very poor. Instead of an enemy vehicle smoothly gliding across the screen in front of you, you see very stilted movement. It appears on the left. Then after a half-second, it jerks to a position half an inch further across the screen. And to make things worse, the controls are extremely sluggish. When the enemy vehicle is in the crosshairs of your sight, you press the fire button. Nothing happens! The vehicle continues to move haltingly across the screen. A couple of seconds later, your bullet appears and passes through thin air.

This game is an exercise in frustration. I played it for hours, figuring that sooner or later I would become used to the reaction time (or lack thereof). But I finally gave up. The basic idea of the game is a winner. But the execution of the idea is unbelievable!

The Amiga is capable of much better than this! I have seen much much better (even in Electronic Arts' own Amiga version of Skyfox). The Amiga deserves better than this! You deserve better than this! Stay away from this game!

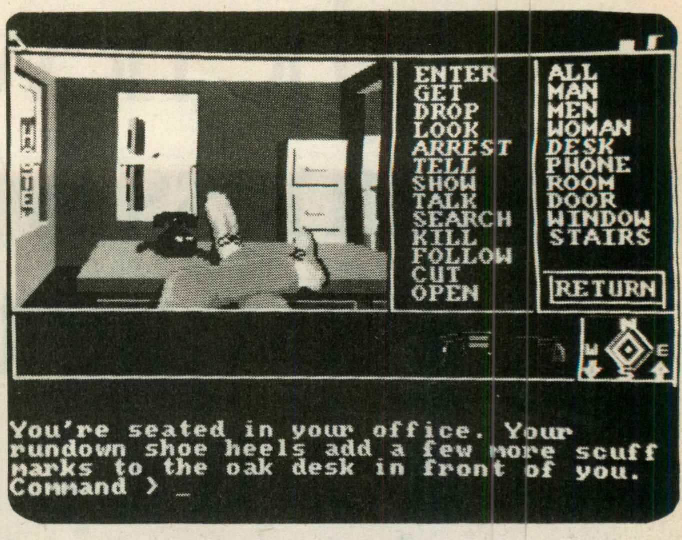
John Olsen

Mindshadow/Borrowed Time

— Amiga 256K
$39.95
Activision

The same popular C-64 graphics adventures have gotten "all gussied up" on the Amiga. The menus and screen interaction are still here, made faster and easier with the Amiga's mouse. The graphics are as handsome and multi-colored as you would expect. *Very* nice.

The puzzles are tough, the settings evocative. In Mindshadow, the player has to get off an island and solve a mystery. What's the mystery? The player has to figure that out, too. In Borrowed Time, the player is a private detective struggling to wrap up his cases while avoiding hoods who would like to turn him in to a hood ornament.



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You're seated in your office. Your
rundown shoe heels add a few more scuff
marks to the oak desk in front of you.
Command > _
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Amiga owners who have already solved the C-64 versions won't find anything new here, just a lot of keen pictures to show off to their friends. Uninitiated Amiga owners will enjoy the glitz and the challenge.

Bob Lindstrom

Capture

— C-64
$39.95
Jason-Ranheim

In many ways, Capture is similar to other "memory dumpers" like ISEPIC and SNAPSHOT 64. But its special claim to fame is the ability to capture the computer's memory and place it on a series of EPROM chips to be put in a cartridge. Basically, if you have a program that resides entirely in the computer's memory, you can "Capture" it on a cartridge. Just think of having your favorite program on a cartridge for instant loading!

Using Capture with Promenade is very easy. Have both plugged in. Push the Capture button to clear the memory. Load and execute your favorite program. Press the Capture button where you want the cartridge version to start. You are then instructed to place the first of three chips in the Promenade programmer. It burns the chip, and then instructs you to do the same with the other two. In a matter of a couple minutes, you have the job finished. Plug the chips in the PC board, place it in a plastic case, and you have your program captured on a cartridge! Fast and easy! And recommended!

John Olsen

Dr. Timothy Leary:

The Role of The Free Agent In The Computer Culture

by Dr. Timothy Leary

Computers are high-speed devices for packaging, storing, processing, amplifying, graphing, and communicating thoughts with incredible precision. Many prominent electronic visionaries and silicon mystics have claimed that computer programs will revolutionize human thinking, create a new Information Society, raise the current low level of human intelligence above the Lascaux-Gutenberg level, etc.

Even conservative historians and just-plain observant people seem to sense that the computer is the most important technological advance of the 20th century. Hmmm.

Such claims make fascinating head-lines, but what, we wonder, has been the reaction of society in general to this historic innovation which is supposed to change human society? Most Americans seem to have produced the normal human reaction. Apathy. Wariness. "Oh yeah. Here's a new gadget that's gonna solve our problems, brought to us by the same gang of starry-eyed engineers who brought us the galley-ship, the Crusades, the guillitine, the Luftwaffe, the electric chair, the atom bomb, toxic wastes, freeway traffic jams, prime-time TV, vitamin-enriched junk-food, the new Coca-Cola, and that warm-weather space-shuttle that wouldn't work at 32 degrees farenheit."

Let's face it, to most Americans the computer is an Implacable Boondoggle Machine™ operated by merciless bureaucrats, like the airline clerk who taps our names into the terminal, frowns and tells us that our confirmed reservation is scrubbed because the flight is over-booked; or the pitiless bank teller who types our names into the keyboard and keeps us sweating for five minutes while the Inscrutable Business Monster™ decides whether to bounce our check.

No question about it, the computer in its early years was taken over by top-management as a tool for improved efficiency, by

Editor's Note: *I'm very pleased to be introducing this month our latest addition to The Guide. Dr. Timothy Leary's makes his debut this month in The Guide, and in future issues he will be exploring various aspects of the computer world, with the insight, humor, and perspective that only he can provide. Dr. Leary, psychologist, philosopher, former Harvard professor, software designer, and revolutionary spokesman for the cultural revolution of the 60's really needs no formal introduction. We all look forward to his always entertaining and thought provoking dialogues in future issues of The Guide.*

goverment officials invading our privacy and bureaucrats who always love tax-supported devices to manage and manipulate their fellow-citizens.

Stanley Kubrick, the greatest film director of the 20th century, was one of the first Free Agent civilians to use the computer for his own creative enterprises. His notorious radar-paranoia immediately sensed the dangers of Artifical Intelligence.

Remember the computerized Doomsday Machine that, with humans taken out of the loop, started World War III?

Remember the movie 2001? Remember when Astronaut Dave leaves the ship in the futile attempt to rescue his buddy who has been shipped off to deep-space by the onboard-AI system? Remember when Dave says, "Open the pod doors, HAL." And the AI program says, "Sorry about that, Dave, but this mission is too important to be endangered by the human factor."

Kubrick, of course, was expressing, with his imcomparable genius, the fears which most of us feel about the computer when it is used as tool of corporate or governmental power. The first generation of main-frames and minis represented everything I, as a Jeffersonian American, loathe and fear. Impersonal Bureacratic Managers™ in charge of my life. Pompous technicians creating a new jargon to intimidate me and extend their control over me.

Computers, before 1976, were multi-million dollar data-engines guarded by security clearances and priestly cults of engineers.

Can you imagine the bright, curious 14 year-old walking up to the Computer Lab at MIT in 1970 requesting to log-on and try out a new electronic game? Or the 20 year old college student in 1972 approaching HAL's home in Champaign-Urbana hoping to data-search for a term-paper? Or the 30 year old teacher, writer, or just-plain intelligent person in 1974, wanting to word process or engage in some mind activity?

The custodians, acting like good Soviet officials, would contemptuously explain that only authorized company members could use computers for approved projects. Computers were not to be used for individual pleasure or personal purpose. Indeed, most computer labs had strict rules and surveillance procedures to prevent individual use.

The executives of companies that manufactured minis actuallly turned down the chance to produce home computers. "What would an individual want with a Individual Business Machine™? Where would you keep it? In the garage?

At the same time the computer underground was growing, invisibly, but with an excited smile on its face. I'm talking about free agents, creative individuals, hackers, code-outlaws, book-lovers, low-life high-brows, low-down high-techies who illegally used the new technology to extend and exercize their minds.

The birth of the Information Age, it seems to me, occurred in 1976 not in a smoky industrial town like Bethlehem. Pa., but in a humble manger (garage) in sunny, post-industrial Silicon Valley. Discovered by two bearded, long-haired wisemen, St. Stephen the Greater and St. Steven the Lesser. And to complete the biblical metaphor, the infant prodigy was named after the fruit of the Tree Of Knowledge. The Apple! The controlled substance with which Eve committed the first original sin. Thinking for Herself!

The personal computer triggered a new round of confrontation in the age-old social-political competition: control by the state and individual freedom of thought. You remember how the Athenian PC's, operated by code-cowboys like Socrates and Plato, hurled back the main-frames of the Persians? Remember how the movable-type press in private hands, printed out the hard-copy that overthrew theocratic control of the Papacy and later disseminated the Declaration of Independence. Surely it it is obvious today that freedom in any country is perfectly measured by the percentage of personal computers in the hands of individuals. There are few, if any, Commodore users in the Soviet Union.

As soon as computers were invented, the Impersonal Business Mechanics™ moved in to monoplize. What shall we call these officials whom Kubrick satirized so brilliantly in the NASA committee scenes in 2001? Orgs?

Orgs tend to see computers as Data Processing engines. They talk about applications and end-users. In the Pentagon or in the federal agencies and in offices around MIT and Carnegie, Mellon and Austin,Texas Orgs talk about machines that will think better than people and eliminate the human-error function.

There is one trait that tends to characterize the engineering and institutional computer users. The Orgs tend to lack a sense of humor. Since they are solemn about life in general, they tend to describe their equipment and their work in pompous terms. That's why a lot of us were turned-off for so long. Let's face it, most of the first generations of programmers and operators were slide-rule nerds, wonderful-but-too-serious guys that couldn't get a date on Saturday night.

Those who like to think for themselves (let's call them Free Agents) tend to see computers as thought appliances. I love the

word "appliance", defined as something individuals use in the home for their own comfort, entertainment or education. You know, like Do-it-Yourself tools. Or high-sci-fi record-players or turn-tables on which you spin your floppy thoughts. Randomly acessed, naturally.

What are the applications of a thought-appliance?

Self-improvement? Self-education? Home-entertainment? Mind-interplay with friends? Thought games? Mental Fitness? Fooling around with your mind? Significant pursuits?

The point is that Free Agents use their minds not to perform authorized duties for the Soviet state or the International Bureaucracy Machine™ but for anything that damn-well suits their fancies as Americans.

Which brings me to a very special group of Free Agents, the readers of the feisty, spirited magazine you are holding in your hand. It seems to me that Commodore owners are the rugged individualists in the software community. The title "Commodore", you know, has not denoted military or naval rank since 1899. A Commodore today is defined as the captain of a private yacht or pleasure craft!

How delightful!

Commodore owners have apparently discovered:

1. That the ultimate organ for pleasure and prophet is the mind.

2. That the brain is an array of 100 billion micro-computers waiting to be booted up, activated, stimulated, and programmed.

3. That the brain is waiting impatiently for software, headwear, thoughtware, sportswear which pays respect to its awesome potential.

4. That to paraphrase Dr. Ruth, that if you don't use your mind, you lose it.

Author's Note: *The publisher of The Guide plans to run my future columns as long as they seem to encourage controversy, excitement, stimulation, innovative thinking and legal mind-expansion. Subsequent columns will discuss the irreverent evolution of personal computing — Pong, Donkey Kong, Hitchikers Guide, Mind Mirror, the Softwear Hall of Fame (dedicated to the ten most eccentric geniuses in the field), appraisals of notable programs, reviews of computer-related books/films, plus Dear Abbey dialogues with readers who care enough about the above to write in. Send any correspondence, questions, suggestions, etc. to Dr. Timothy Leary, c/o The Guide To Computer Living, 3808 S.E. Licyntra Court, Portland, Oregon, 97222.*

Potpourri

Amiga Party Game of the Month

One player is a timekeeper and starts booting up Electronic Arts' **DeluxePaint**. The other players race into the kitchen and consume as many bags of taco chips as possible before the program actually appears onscreen. In case of a tie, the winner is the player whose hair has grown the most since the boot began.

It's the miracle of EA copy-protection, the value-added feature that lets you take a nap or throw a party while waiting for your program to load. It sure woud be nice, though, if EA would take the time-consuming copy protection off their Deluxe series productivity software. We're developing an addiction to taco chips.

Cee Dee Eye?

CDI is the subject of much chatter in computer industry backrooms these days. The new computing system being developed by Sony and Phillips integrates a Motorola 68000 chip (the same as in the Amiga) with Compact Disk technology. Use the unit to play digital disks if you will; but the system will also store digital data and video as well as music. Attach a keyboard and you have the world's first integrated audio-video computer system.

Major players are betting that some version of this technology will be at the center of the next generation of home computers. Wait'll the hackers get this one home. *Then you'll see a* version of Strip Poker that you won't believe.

Silicon Valley Knee-Slappers

Scuttlebutt around Silicon Valley these days has almost everyone praising the Amiga but puzzling over Commodore's lack of promotion for the wonder machine. A not-so-innocent joke is making the rounds over this frustrating state of affairs:

An IBM, Apple and Amiga executive were traveling together in an obscure country when they suddenly were arrested and sentenced to death by beheading (You buy the premise, you buy the joke).

When the time for execution arrived, the three prisoners were given the choice of facing the basket into which their unfortunate noggins would drop or of facing the blade as it approached their quivering throats.

"I want to savor every last second of my life," crowed the IBM executive, "I'll face the blade."

He was strapped in, his gaze transfixed by the guillotine blade. The handle was thrown, the blade plunged toward its destination but, miracle of miracles, stopped falling only six inches from the IBM execs' neck.

The startled executioner proclaimed that the gods had rewarded the man's courage and he was set free.

The Apple executive also faced the blade. It was released. It halted inches above his throat. Once again, the gods had spoken. The Apple guy's life was spared.

Finally, the Amiga executive announced his choice. He, too, would watch the deadly blade. However, shortly after he was strapped into the guillotine, he began laughing uncontrollably.

"Are you going crazy?" asked the executioner.

"No way," responded Mr. Amiga, "But the gods *didn't* stop the executions. You've got a little screw loose that's jamming the blade on the way down."

Apple Corp To The Rescue

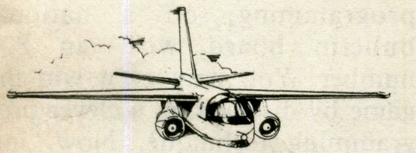
In what may be their biggest move of the year, Apple Computer Inc. has surpassed all challengers and now holds a considerable lead over its competitors in the race to redefine the paranoia level within the high-tech industry. In a daring move to prevent unauthorized leaks to the press about forthcoming Apple products, the makers of the Mac have hired a private investigation firm to improve security among third party software developers.

These private detectives, it is hoped, will both locate these premature releases of information to the press and help the software developers improve their *internal* security. The silicon grapevine reports that the investigation has broadened to include a prominent (but un-named) writer for a prominent (and again, un-named) Apple publication. No one is talking about what action will be taken when the private dicks finally catch their man, but one can easily imagine Sam Spade interrogating a suspicious programmer in some abandoned mail order warehouse in San Jose.

Once the rest of the industry catches on to this latest breakthrough from the Apple Corps, it's likely that one night soon you'll hear it first on Entainment Tonight that the folks over at Big Blue have lured Baretta out *of retirement to* deal with Far East Espionage.

Computers In The News

We've all heard about the high-stress demands on air traffic controllers. It seems, however, that not all Federal Aviation Administration employees are getting eyestrain from staring at radar displays of incoming flights. While the controllers are juggling flight paths and jumbo jets, their counterparts in the research and development branch of the FAA have been busy freeing the airways of space invaders. Jack Anderson reported recently that FAA employees have been using government computers to store copies of popular computer games, such as Donkey Kong and Space Invaders, and then later downloading them to their personal computers at home. These enterprising government employees had accumulated a software libarary of nearly 100 pirated programs before their little software distribution network was uncovered.



Let's hope this corrupting influence has been brought to an abrupt halt. Can you image circling endlessly at 12,000 feet (with the No Smoking sign on!) while the controller finishes one more game of Zaxxon?

In a similar report, Anderson cited a programmer at the Environmental Protection Agency who ran a computerized gambling network on federal computers for almost five years before being discovered. His justification, when caught? It was good for employee morale, and besides, he was just doing it to develop his programming skills!

Perhaps he should be sentenced to three years of non-stop Radar Rat Race?

Next time you're waiting in line in a government office, and it seems that the employees are all intently studying their CRT's rather than helping you, you might just casually ask what it is on the screen that is so interesting . . . .

DOS With a Twist

"It's quarter to three, there's no one in the place, except you and me. So, boot 'em up, Joe."

Here's the question of the month: Which Commodore product has a hangover?

Answer: The 1541 disk drive. In the User's Guide to the 1541, page 18 explains the Duplicate command as "a hangover from the operating systems that were contained on the dual drives . . . ".

Pour another tall, cold one for Commodore's manual-writing staff. 1541 — The Drinking Man's drive.

CPU Sex

Spencer Steere. Sounds like a bank president or ad agency executive, a solid guy in a three-piece suit. Yeah, that's it, a three-piece suit. Spencer Steere is the very blonde, very attractive (gulp) PR director of Infocom, the company that not only has some of the best-playing text adventures in the business, but also one of the best-looking PR departments in the business.

In the mail recently we received Spencer's press release for Infocom's raunchy new Steve Meretsky adventure, **Leather Goddesses of Phobos**. Like the game itself, Spencer's press release was written in three, uh, flavors: tame, suggestive and lewd.

OK, think about blonde, petite and vivacious and then read these excerpts from the "lewd" release:

"Grease up for an erotic romp through space in Leather Goddesses of Phobos . . . Early in the story, you reveal yourself to be a handsome stud or a sexy siren . . . You're often distracted, however, by the erotic adventures to be had on other planets, in particular the Sultan's wife (or the Sultana's husband) with whom you have a full hour of wild sex."

Now picture Spencer, as described, sitting devilishly at her desk writing that prose. Yeah, we prurients at the office liked the idea, too. Leather Goddesses of Phobos is available for C-64/128's and Amigas in September for under $40.

Who Was That Masked Amiga?

The rumor mill has ground on for months about how an Amiga will be playing a major role in an upcoming episode of the popular TV series Miami Vice. But who's gonna know? Maybe no one.

According to the grapevine, the fashion-conscious show took the Amigas from Commodore and promptly painted them black to fit in with their video decor. Great.

So, the next rumor mill topic? Why, Amigas in your choice of decorator colors, of course. I'll take an Amiga Ranger in Palm Springs Puce, please.

■

Major Bank Goes ON-LINE With Video Broker, Banking Services

by David Shiloh

The Chase Manhattan Bank initiates an on-line service called **Spectrum**, and the world of C-64 telecommunications grows a little. The innovative service makes accessible not only banking services, but also stock information and transactions, to network members in the comfort of their own homes.

Granted, 300 baud is not thrilling, but it's their dime — an 800 number for access — and you can play an on-line adventure game all day or get thoroughly lost exploring. You can get a quote on the price of stocks — CBU, for example, (that's CBM), currently is listed to be worth per share about as much as a half-dozen floppies.

Careful: if you get a quote on the price of stocks more than thirty times in a month, it'll cost you 15 cents for #31. The daily newspaper with the stock quotes costs 25 cents, the telephone call is free . . . .

At long last! Credible people, serious about money matters, have put in a consumer-oriented bulletin board. That's right, this one has a built-in BB. It also has IntraCom and an electronic mail service. You can pay bills, buy and sell stocks, *or play an interactive* adventure game that uses high finance as a theme to teach you what it's all about in the market.

Chase Manhattan's obvious ulterior motive is to make money with this, both in increased deposits and in stock trade and discount brokerage fees. But, hey. What do you want? Five dollars ($5.00 !) a month for unlimited connect time with no carrier charges? *That's what you get!*

Some professional attention has been paid to this one. It's menu and/or command driven, and logically organized. Included are two plastic cue-cards (an original and a backup) for the computer top, showing a picture of the control/function keys on one side, with details of these and a list of commands on the other.

The package also includes documentation for each area in Spectrum, all in a pocket binder for your desktop or shelf. I didn't believe what I was reading. I had to plug in to see whether plugging in was as easy as they claimed! That's how I found out how tight their security is.

Typically, I didn't have my two-part password handy, so I typed garbage and logged off. When I called again, the system had me locked out because of some unidentified activity involving my disk.

Yep, there it is, right there in their unprotected and singularly readable terminal program: read the serial number and other password coding from the disk and send it when connected. Beautiful! It has superb telecommunications programming and relies not on copy protection or technique secrecy, but on strictly professional methods to protect what's important: *Your* money and financial transactions, not *their* programming genius.

I've had it with wandering in the caverns of kafka-esque databases, and 300 baud makes any kind of real-time interaction hopelessly dull. But it is a pleasure to have available an easy-to-use, low-cost, professional application for the Commodore 64.

Imagine playing an interactive adventure game that teaches programming, on a national bulletin board with an 800 number. You may even win the game by discovering a clever programming technique. Now, imagine calling Customer Service and having your problem solved *while* you are talking to the representative, who knows what kind of equipment you are using and the status of the software updates you'll receive next week. Move over, BB Bumblers, the pros have discovered Commodore users.

Yes, the bank wants to make more money. But take a look: people who make money have it (and vice-versa), and those who make the most know how to spend it. Spectrum is money spent on making money. Chase is spending it, and they're more interested in deposits and stock transactions than in connect-time charges. They make it *simple and* painless.

This is well worth checking out if you use banks, moreso if you buy stock, and definitely so if you want to see user-friendly telecommunication.

But *1200 baud* would be very nice — if I could afford the modem.

■

Computer Widow's Compendium

Computer Games That Play Themselves What Threat Are They To The World?

by Lyn Chase

In the last few months, I have become aware of a phenomenon that has me completely baffled. It is the "use" (and I use the term questioningly) of computer games that play themselves. No, the games don't play each other — they are self-contained units. They do whatever it is that they do independently. Just load the program, start the action, and return hours later to find that a whole season of baseball, football, etc. has been played without so much as a Bronx cheer.

I first became aware of these games several months ago when, at two o'clock in the morning, I stumbled up the stairs to Randy's office to see why he wasn't fast asleep beside me. There I found him working on accounting on one computer and running these "sporting events" on a few others. They were so fascinating that much of the time he didn't even bother to use the monitor. He simply checked every hour or two to see whether the game was still running. Or whether it had completed the game. Or the series. Or the season. Or the century.

Now, I don't mind a little entertainment. I happen to prefer to see a movie. Or a ballet. I enjoy the grace and agility of gymnasts in competition. I even occasionally enjoy viewing the skill (and all those rippling muscles) of professional basketball players as they vie for victory. If I reach deep into my understanding of the human condition, I can even understand (somewhat) the ability of certain people to be entertained endlessly by fast-moving, mentally stimulating computer games. But I cannot understand why, when one can watch the human form in action with a beer in one hand and the sports page in the other, one would choose to "play" computer sports games — and not even bother to watch them!

In an attempt to research this puzzling situation, I called Quest, Inc. to speak with Ed Daniels, the programmer of several of these "automated" games. Although Mr. Daniels was not in, I had a lovely conversation with Elaine Casale, another employee. When I explained why I was calling, we found common ground. Both our husbands are sports nuts — but her husband plays real games and mine plays computer games. I commented that her situation was better because at least her husband got some exercise. She said my situation was better because at least my husband was home. We decided that the only difference was that she prays for rain and I pray for a power failure.

While I cannot come up with one good reason to play these games, I can come up with several reasons not to. First of all, it is a poor use of electricity. Being the party pooper that I am, I don't buy the argument that personal computers use such minute quantities of electricity as to be immeasurable. If in doubt, compare the bills you got before the acquisition of the "PC" and after. They're sure to be higher. Everything is higher than it was a year or two ago. If you are in your thirties like I am (or younger) you have *never* seen prices go down — except for specific items like gasoline and Commodore Computers.

Another good reason not to play these "run-by-itself" sports games is that it perpetuates the philosophy, "It's not how you play the game, it's whether you win or lose". How would you like Junior to go out on the field and beat the living daylights out of the opposition because all that really counts is the "stats"?

Yet another reason not to play these games is that you miss out on all the exercise you would have gotten had you played a game that required you to push the keys or use the joystick. *Some people print out a list of all the action in each game.* What a waste of paper!!!

One might argue that since the games play themselves, hubby can be out changing the oil or barbecuing the burgers while the games run. But when was the last time you remember your husband doing *anything* else while a computer was turned on? Furthermore, the argument is sure to come that another computer is surely needed for use while the original computer is tied up with these "ignore-it-till-it's-done" sports games. Do not buckle under the pressure of this argument. We have at least six computers in the house. I have seen no less than *five* of them in use by Randy alone!

As I understand it, when a programmer is writing a game like this, he (PLEASE don't ask me to say "or she") enters the statistical information on real teams and players, using the historical data of past games and seasons. When a player in the baseball game comes up to bat, the computer uses the statistical information in its memory to decide whether the player hits or misses, walks or runs. Incidentally, should hubby decide to get involved and manage the team, he can tell the computer to leave the decision making up to him. I cannot even attempt to explain the football version because to me, football is as confusing as electricity.

Mr. Daniels called me back and I'm so glad that he did, because he explained something to me that I didn't understand before. There is a segment of the population which I knew existed but simply didn't understand. As it turns out, my husband is a member of that segment. This group is fascinated by statistics — pure, simple, wonderful numbers. But what I want to know is this: why won't the person so enamoured of numbers balance the checkbook?

■

I'm Sorry, But I Don't Speak Hexidecimal

by Shelly Roberts

There's a computer account up for grabs. Advertising agencies are notoriously nuts when any account is up for grabs. With computers, about which they understand absolutely *nothing* except that the computer companies spend an inordinate amout of money on advertising.

And, incredibly enough, I got the assignment; me, a qualified computer hacker!

The last agency I worked for got so nuts when a digital account was available (oooh, digital technology) that they immediately pressed into service the two most creative analog computer illiterates in the place. Two guys who seemed ready at any minute to retire to Oregon to bake bread in their hand-made log cabin.

"But what about me?" I wondered. "I know a lot about computers. And video games." (This was in the very early eighties.)

No. I didn't fit into their madness. That would make much too much sense. The analog guys got the assignment. I don't eat sugar, so naturally they put me on the dessert topping account.

As luck would have it, it was just as well. The computer account then was for video games. It didn't make any difference that the two guys doing the ads only played chess and had to call Maintenance to change light bulbs or plug things in.

It didn't matter because the people who made these particular video games were all ex-pilots who had no idea what other people wanted to play. They had invented a game called "Lost Luggage," something about people chasing underwear around airports. Needless to say, the video game company went belly-up in no time flat, sticking the agency with about three million bucks in unpaid bills.

Nobody blamed the analog guys. After all, how could they have known that the games were no good. They didn't play them.

I didn't stick around that agency very long. But I knew that this was the typical way for assignments to be parcelled out in Big New York Ad Agencies. Whoever's in the hallway at the wrong time often gets tabbed. Forget qualifications.

But not this time. This time I got the nod. I knew this place was smarter than the average when I signed on. But I never suspected that they were actually smart enough to look over their list of available talent to see who on the list had actually had their hands on a keyboard.

Maybe it was because I have been bugging them for four or five months now to get me a computer of my own and turn the electric typewriter they issued me into a paperweight. Maybe they figured out that they need a shill in meetings who knows the difference between a gigabyte and a monkeybite.

So, I got the assignment. I am in the process of trying to tell blue suits the differences between a micro, a mini, and a mainframe. Concepts like RAM and ROM being clearly well beyond their ability to translate into English, they are counting on me to do what's right. And, in the meantime, I keep trying to answer questions like "Well, then, what exactly *is* a program? I mean, what does it *do* ?"

I haven't yet had any time to create any advertising for this potential client. No doubt whatever I come up with will be full of meaningful insights that will arrow-shoot directly into the heart of the computer consumer. The potential client will see that it would be foolish to take millions and millions of wonderfully spendable advertising dollars any place else. But, in the meantime, I am having fun impressing my own crew with the fact that I have actually held a floppy disk in my own two hands.

If we don't get the account? Well, I suppose it will probably be considered my fault. These folks seem to believe that if you know anything about computers, anything at all, you know everything there is to know about computers.

Compared to them, I do.

The trick will be convincing this potential client that I know more than just enough to stay awake for a five-hour briefing. (A five-hour BRIEFing ??)

And if I don't convince them? Well, I suppose I could always go back to writing dessert whip copy for a living.

■

More Computer Magic: Numeric Mental Mystery

by John Olsen

The magic tricks that have appeared in this column for the past year have all featured mentalism. Each has involved some type of mind reading. And this month's trick is no exception. This trick is a very simple and straightforward one. It will be presented by the computer, but with practice could be performed by a human as well.

The only apparatus required for this trick is the computer. If a human were to perform this trick, it would require no apparatus at all. All it requires is for your audience to think of a number, and perform some mental calculations. After several steps, the computer (or human mentalist) will reveal the number that only the audience knows!

The strong point of this trick is that it can be repeated without detection. Each time the trick is presented, it will result in a different answer. Even if the person picks the same number to start with each time the trick is played, the result is still different. And the magician (or computer) correctly reveals the result every time.

To repeat the trick, simply change the directions slightly each time the trick is performed. On the computer, this is done randomly so that the computer can keep track of how the number is being manipulated, but the audience will get a different result.

The trick is based on simple algebra. It makes no difference what number is originally chosen. Using algebra, the result will always be known after following several simple steps. These steps involve addition, subtraction, multiplication, and division. No algebra is used by the audience. Algebra is only used behind the scenes to solve the riddle.

The secret will be revealed in the remainder of the article, along with some programming techniques. Unless you want to know how the trick is accomplished, now is the time to stop reading, and start typing the program into your computer. When finished, the program can be run and the trick will be performed by the computer. You'll enjoy this one. It is simple, but quite confounding.

A sample session with the computer might go as follows:

1. Think of a number; any number.
2. Double your number.
3. Add ten to the answer.
4. Divide the result by two.
5. Subtract your original number.
6. Multiply your answer by four.
7. Finally, add three.

At this point, the computer will tell you what number you are thinking of. If you try the above sample, you will always end up with 23. The reason is based in simple algebra. Let's go through the steps and show how they can be transformed into algebraic expressions.

X	Think of a number.
2X	Double your number.
2X + 10	Add ten to the answer.
X + 5	Divide the result by two.
5	Subtract your original number.
20	Multiply your answer by four.
23	Finally, add three.

As you can see, after the fourth step, the number will be five, regardless of what number was originally chosen. The *last* two steps simply manipulate the known number to further confuse things.

Naturally, if these same steps were repeated each time the trick is performed, the trick would not stand up under much scrutiny. So alternate steps must be available to replace the ones above. Instead of doubling the original number, you can also add the next consecutive number. The following example shows how this would look:

1. Think of a number.
2. Add the next consecutive number.
3. Add seven to the answer.
4. Divide the result by two.
5. Subtract the original number.
6. Multiply the answer by six.
7. Subtract four.

In the above example, the answer will always be 20. An algebraic description follows:

X	Think of a number.
2X + 1	Add the next consecutive number.
2X + 8	Add seven to the answer.
X + 4	Divide the result by two.
4	Subtract the original number.

24 Multiply the answer by six.
20 Subtract four.

Again, the answer will always be 20 regardless of what number was originally chosen. In these examples, different methods were used to eliminate the original number, and leave a known amount. In both samples, the original number was doubled, then cut in half. This effectively cancels the two steps.

Note that we have used two ways to double a number. One way is to simply double it. The other is to add the next consecutive number. This second way not only doubles the number, but leaves you with one extra.

After doubling the number, some *even* number is added to the total. In this way, when the result is divided by two, there is no remainder. And when the original number is subtracted, only a known result remains. One thing to watch, is that when adding the next consecutive number you have one more than double the original number. So, under these conditions, you must add an *odd* number to the total. In this way, the result can still be divided by two without leaving a remainder.

After dividing by two, if the original number is subtracted, only a constant number will remain. At this point, the number could be revealed and the trick could be concluded. But to add misdirection and confuse things further, two additional steps are incorporated which still give a known result.

The program listing is fairly straightforward. Lines 10-30 set up the first screen. Line 40 goes to a subroutine which waits for a key to be pressed, then changes the screen colors and returns to the main body of the program. Then the computer randomly chooses either 0 or 1. Depending on the value of the random number, one set of directions is given. If the random number was 1, then line 50 is printed. If it was 0, then line 60 is printed.

Line 70 waits for a keypress, then picks a random number between 10 and 110. Notice that this is forced to be an *even* number. In line 80, you are instructed to add this number to the previous result. In case line 50 was printed (and you were instructed to add the next consecutive number) you will need to subtract one to make the number *even*. This is taken care of by adding S – R to the previous result. Remember S is even. If R was 0 then S – R is even. If R was 1, then S – R is odd.

Line 90 directs you to divide the previous result by two. Line 100 has you subtract the original number. At this point, the result can be algebraicly described by the variable S/2. Line 110 picks a random number from 3 to 7, and line 120 directs you to multiply your previous answer by this number. Line 130 computes the current answer, then waits for a keypress.

Line 140 picks a random number of either 0 or 1. It also picks a relatively small number called S; to be exact it picks a number that is one third of the current answer. If the earlier random number was 0, then S is added to the current result in line 150. If the random number was 1, then S is subtracted from the current result in line 160.

You are asked to concentrate on your answer in lines 170 and 180. Lines 190 through 210 print out the mentally chosen number after an appropriately flashy display. The trick never fails, and can be repeated without fear of revealing the secret.

In this trick, the computer plays an important part. It randomly changes the directions each time the program is run. In this way, the trick can be repeated without giving the audience a chance to try to penetrate the secret of the trick. The trick would be difficult to figure out, even if the directions were the same each time. But when they are constantly different, it becomes impossible to determine the method of the mental effect. This is a good example of applied algebra in magic.

■

```
1 rem * * * * * * * * * * * * * * * * * *
2 rem *                                 *
3 rem *     (c) 1986 john olsen         *
4 rem *                                 *
5 rem * * * * * * * * * * * * * * * * * *
10 p=2:poke53280,p:poke53281,p
20 print"[ctrl-n][ctrl-h][blk][clr][2 dw
n]Mental Mystery[12 spc]by John Olsen"
30 print"[7 dwn][4 spc]Think of a number
.  Any number."
40 gosub230:r=int(2*rnd(0))
50 ifr=1thenprint"[4 spc]Add the next co
nsecutive number.":goto70
60 print"[10 spc]Double your number."
70 gosub230:s=2*int(50*rnd(0))+10
80 print"[3 spc]Take the answer and add"
s-r"to it.":gosub230
90 print"[8 spc]Divide your answer by 2.
":gosub230
100 print"[3 spc]Now subtract your origi
nal number.":gosub230
110 r=int(4*rnd(0))+3
120 print"[7 spc]Multiply your answer by
"r"[left]."
130 a=r*s/2:gosub230
140 r=int(2*rnd(0)):s=int(a/3)
150 ifr=1thenprint"[4 spc]Finally add";:
a=a+s
160 ifr=0thenprint" Finally subtract";:a
=a-s
170 prints"[left].  Then concentrate"
180 print"[3 spc]on the answer which onl
y you know.":gosub230
190 printtab(13)"Your number is[dwn]"
200 forx=1to100:poke53280,xand15:poke532
81,xand15:nextx
210 printtab(18)a
220 goto220
230 print"[6 dwn][8 spc]Press a key to c
ontinue."
240 wait197,64:wait197,64,255:p=p+1:poke
53280,p:poke53281,p
250 print"[clr][8 dwn]":return
```

Machine Language

From The Keyboard To The Screen, RAMbo McCormick Begins The Tour

by David Michael McCormick

Do you cringe when someone brings up the subject of machine language programming? Do you feel vaguely inadequate because your previous efforts with ML left you confused and intimidated? Or are you convinced that there has got to be something wrong socially with anyone who learns to speak ML to his computer?

Learning a computer language is like learning a human one — they all come from man. There are two approaches: You spend years studying grammar, spelling, conjugating and doing various formal exercises. Or you get off the plane, try to tell the cab driver what hotel you're staying at, find something to eat, and ask where the john is. You'll never pass for a scholar using the second approach, but it is the stuff of adventure. Experience is the best teacher.

Well, get a grip on your DIP switches; you're about to get off the plane. David Michael McCormick, a guerilla warrior straight out of the Silicon Jungle, is about to take you on a ground-level tour. Look alive now, McCormick is liable to take a shot at anything that doesn't move. There will be strange sights and sensations ahead, but hang loose, you'll pick it up. Just don't let 'um know you're scared.

The first problem I had with machine language had nothing to do with registers, addressing modes or kernal calls. It had to do with the fact that my C-64 User's Manual said nothing about how a keypress became a character on the screen. It seemed pretty straightforward, actually: I pressed a key, two wires got connected. The circuitry detected the event and put a corresponding set of dots in the appropriate location.

But, lo and behold! Exactly how this took place in terms of machine language activity turned out to involve "proprietary information" and "trade secrets" that Commodore wouldn't reveal, even if you called and asked! It was like yeast, which was kept an utter secret for centuries by the bakers' guilds; or the eye of the needle, originally concealed under threat of death by the tailors' and sail-makers' lodges.

Finding the answer to that simple question cost me a year and more than seven times the price of my computer — and the C-64 is an open book when you compare it to, say, an Atari or an Apple IIc.

So the first problem turns out to be software politics. Anyone trying to learn machine language faces an army of industry executives: sophisticated, organized and armed with Silicon Wealth. These men have structured the very laws of the land to prevent you from getting their "proprietary information."

Once that ridiculous fact penetrated the semi-permeable granite above my eyebrows, things got easier. I was not suffering from terminal idiocy after all. I had been trying to make sense of the industry mysticism that masquerades as information!

ML is so very simple, really. It has to be, since this pile of sand and solder is not a thinking machine at all; but rather a collection of on/off switches. There is no such thing as a user-friendly computer. Without a set of programmed instructions, all computers are equally inert.

You can test it. Type `POKE 1,0 [RETURN]` on your C-64 and bing, it's dead! It's still a computer, but the operating system is no longer operating because all the instructions have been switched out and the microprocessor can't find them!

So what do you do with 65,536 empty switches? How does the operating system start operating? What is the first instruction, and what happens next? How does a keypress become a character on the screen? Turn your dead computer off, wait a second or six, and turn it back on, then type in the following BASIC program:

```
26 read a:poke 4096+b,a:b=b+1:if b<26 go
to 26
28 poke650,128:sys 4096
30 data 120         : rem turn off the op
erating system
32 data 169,0       : rem get a zero into
 the accumulator
34 data 133,198     : rem put it in the b
uffer counter
36 data 32,135,234 : rem scan the keyboa
rd
38 data 165,198     : rem check the buffe
r counter
40 data 240,249     : rem go back and sca
n again if empty
42 data 173,119,2   : rem otherwise get t
he character
44 data 201,95      : rem compare it with
 "[BACK ARROW]"
46 data 8           : rem save the result
s on the stack
48 data 32,22,231   : rem print it on the
 screen
50 data 40          : rem retrieve the co
mparison from the stack
52 data 208,233     : rem go back to clea
r the buffer if not a "[BACK ARROW]"
54 data 88          : rem otherwise turn
the system back on
56 data 96          : rem and return to "
BASIC"
```

This program pokes a machine language program into memory that effectively turns off the C-64's normal operating system (line 30). It then enters a loop that takes a keypress and turns it into a letter on the screen (lines 32–52). When you press the back-arrow ("←"), it turns the operating system back on and returns to BASIC (lines 54–56).

Although the operating system is turned off, the instructions that make it up are still available in memory: they have been switched OFF, not OUT like we did with the POKE 1,0. The key-to-screen loop uses a small part of the operating system that reads the wires on the keyboard to see if you have pressed a key; and another larger portion of the oprating system that prints a character to the screen.

In lines 32–34, we clear the space where keypresses are counted. In line 36, we use the KEYSCAN routine to read the keyboard, and then check the counter in line 38. If no key was pressed, line 40 branches back to the KEYSCAN routine; otherwise, line 42 retrieves the character code from the buffer space where KEYSCAN puts it. Line 44 compares the character code with the code for back-arrow ("←"). We don't need to act on this information just yet, so line 46 saves the results on the stack (equal or not equal), along with the status flag that turns off the operating system.

Line 48 calls the operating system routine that prints a character to the screen. That routine turns the operating system back on just before it returns, but line 50 recovers the "status register" flags from the stack and turns it back off again! Line 52 sends the program back to the top of the loop (to line 32) if the keypress was not a back-arrow, otherwise lines 54–56 restore the operating system and return to BASIC.

While this is happening, little else is going on — the clock is not being updated, the stop key is not being checked, the cursor is not blinking — and if you do not press a key, the machine will remain in that small loop from line 32 to line 40. Also, when you run the program, you will note that you can hardly press a key and release it quickly enough to print just one character. That gives you an idea of the speed available with machine language. We're bypassing operating system setup routines, eliminating the "interrupt" cycle altogether and using a routine that normally executes "only" sixty times a second from twenty to several hundred times as often.

This short (26-byte) machine language program employs eleven different instructions, including four that are almost never mentioned in machine language tutorials. In assembly language, it looks different from the way it appears in a series of DATA statements:

```
counter = $c6       ; keyboard buffer co
unter at 198
buffer  = $0277     ; keyboard buffer at
 631
scrchar = $e716     ; screen character r
outine at 59158
scankey = $ea87     ; SCANKEY routine at
 60039
* = $1000           ; our program starts
 at 4096
setup   sei         ; set interrupts
start   lda #$00    ; zero the keyboard
        sta counter ;    buffer counter
scan    jsr scankey ; read the keyboard
        lda counter ; check the counter
        beq scan    ; if empty, repeat s
can
        lda buffer  ; fetch the characte
r
        cmp #$5f    ; is it "[BACK ARROW
]"?
        php         ; save the compariso
n results
        jsr scrchar ; print the character
        plp         ; retrieve the compa
rison results
        bne start   ; if not "[BACK ARRO
W]"   then start over
        cli         ; clear interrupts
        rts         ; and return to BASI
C
```

Similarly, the space inside the C-64 looks different from the perspective of machine language. *Our* program uses a "zero page" location — "counter" — where we would use a variable like "c%" in BASIC; and a non-zero page location — "buffer" — where

we would use a variable like "b$" in BASIC. Subroutines located in the operating system kernal ROM are called as we would use GOSUB in BASIC, except that in this case the subroutines are in ROM already and are not in our 26-byte main program.

The stack is an extremely valuable area that is nearly always available: shelf beside the stove where you stick an idle hotpad for a second. The microprocessor registers — we use the accumulator and the status register — are the center stage where the main action takes place. The accumulator is usually the busiest place in the computer. Like a tray at a cocktail party, it is used primarily to transport stuff from one place to another and present it for decision. Where it comes from, where it goes, and how it's seen are at least as important.

Together, they all form a dynamic, interactive environment with little or no wasted motion; unlike BASIC, which has a great deal of "overhead" that has nothing to do with the program being run. Add the following lines to the BASIC program shown above:

```
10 print"[shift-clr/home]":v=53248:for c
=0to16:read a:poke v+c,a:next
12 for c=1to14:read a,d:poke v+a,d:next:
for c=8192to8256:poke c,255:next
14 p=2040:for c=0to7:read a:poke p+c,a:n
ext
16 print"[ctrl-n] [cyan] [down 3] [right
 8] [right 8] [grey 3]
18 print"[right 9] press a key to contin
ue [home]":wait 197,64,64
20 data 34,77,34,98,34,119,34,140,34,169
,34,70,34,112,34,154,0,21,255
22 data 23,224,27,0,29,255,32,11,33,11,3
9,3,40,3,41,3,42,3,43,15
24 data 44,0,45,0,46,0,0,1,2,3,7,128,128
,128
58 poke v+21,0
```

This program displays the contents of zero page and the stack in a window on the left side of the screen, bit by bit. The light blue is zero page, the light grey is the stack.

Starting at the top of the blue, memory location 0 is at the top left, with the most significant bit on the left. Location 1 is to the right of location 0 and you can see that it is constantly changing. Location 2 is to the right of location 1, and is empty (it contains a zero, *so no bits are lighted*). Location 3 is below location 0, location 6 is below location 3, and so on.

The grey displays the contents of memory locations 448 to 511, which is the active portion of the C-64 stack. Again, the display has the lowest memory location at the upper left, the highest at the lower right.

As the program sets up, the window and memory contents will appear with a flurry of activity as the "poke" instructions are executed. Then the activit will subside as the program waits for a keypress, an you can see the continuous action of the operatin system as the "interrupt" cycle continues to updat the clock and perform its other functions, changin zero page locations and using stack space. Watch unti you can detect the regular rhythm of the operatin system.

When you press a key, there will be a flurry of activity as the program pokes the machine languag routine into memory, and then all action will stop as i takes over, turns off the operating system, and wait for you to press a key.

Try pressing the SHIFT, COMMODORE STOP, and CONTROL keys: their effect is differen from the other keys, as you will see on the memor display. As you press various keys, try pressin SHIFT, "A" and "D" all at the same time. The zer page and stack locations that are changing are bein used by your machine language program, and whe you are not pressing a key, all action is stopped: th computer is not dead, it is in the loop that use SCANKEY, which does not change any of the locations on the display.

When you press the back-arrow, the display wil be turned off by line 58. To turn it back on again i direct mode, type `POKE 53269,255 [RETURN]` an the same memory will again be displayed. However this time, the zero-page location *that* indicate whether the cursor is on or off will be active: it will b flashing along with the cursor. And, of course, th operating system and its interrupt cycle will again b using memory space in the display area.

We have not entirely answered the question o how a keypress becomes a letter on the screen, but w *have* stripped away most of the machine languag machinations that usually do it. The BASIC interpreter, the operating system interrupt, and the KERNAL input routines are all involved in this particula process whenever you turn on your C-64, togethe with the VIC (video) chip, both CIA (interface) chips and the character generator ROM: all specialize devices driven by machine language programs such a the one presented here.

Our program has turned off the normal interrup cycle, called two "primitive" subroutines, used th stack, employed conditional branches, and completely taken over the computer — not too bad for 26-byte introduction to machine language. By th time we have the whole explanation of the keypres question, there *won't be* too much left because gettin a file from the disk drive at five times normal speed i a simple 63-byte "primitive" at its core, and easie than reading the keyboard.

■

1

1 1

1 2 1

1 3 3 1

PASCAL'S TRIANGLE

Fast and Accurate Powers

by Carmen Artino

Now that we know how to BINTODECTOBIN we can turn our attention to the algorithm I mentioned last month for computing b^x. I shall restrict myself to INTEGER exponents this month because the routine is somewhat easier and not as machine dependent as the one for real exponents. Next month, I will finish with the case when x is REAL. In this installment, as well as the next, I will make use of the DECTOBIN part of last month's column.

Problem: suppose we are asked to write a Pascal function which will compute b_{23}? That is, the function is to return the quantity b_{23} when given the value of b. (We will use 23 for demonstration purposes here; later on, any legal input will be accepted for the exponent.) One solution is provided by the following routine:

```
FUNCTION intpower(b: REAL; x: INTEGER):
REAL;
VAR i,pwr: INTEGER;
BEGIN
  pwr := b;
  FOR i := 1 TO x - 1 DO pwr := pwr * b;
  intpower := pwr
END;
```

A call to intpower with $x=23$ will then return the value of b_{23}. Well, what could be easier? True enough, but let's take a closer look at this method. For each pass through the FOR loop, a multiplication is executed. This means that with $x=23$, 22 multiplications must be performed to compute b_{23} which is not all that efficient. Besides, we eventually want to be able to compute b^x when x is not an integer and the above code makes no sense in this case.

Let's look at another approach to the same problem which will improve efficiency by cutting down on the number of multiplications that have to be performed. This method is easy but it does require that we recall just a bit of our high school algebra. (Please don't faint on me. When you read through what follows, you may not even know you used some of that awful stuff you were forced to take just to get your high school diploma. Besides, your algebra teacher *told* you it was going to useful someday, didn't he/she?)

Recall from last month's article that we can express 23 in binary as 10111. This means that b_{23} is also b_{10111}. In its expanded form:

$$10111 = 1*2^4 + 0*2^3 + 1*2^2 + 1*2 + 1$$
$$= 1*16 + 0*8 + 1*4 + 1*2 + 1$$

Using the binary representation of 23 in this expanded form, we can therefore write,

$$b_{23} = b_{16} * b^0 * b^4 * b^2 * b^1$$

This simply means that we can find the value of b_{23} using this last expression by evaluating it from right to left. To see the details, look at the binary representation, 10111, of 23 again. The right-most bit (the least significant bit or LSB) is a 1. This means

that the right most factor in the displayed equation is just b^1 or b. Next, the bit to the left of the LSB in 10111 is also a 1 but it is in the "twos" position. So, we multiply the first b by b^2. Thus we have the first two factors, $b^2 * b$, in the expression for b_{23} given above.

The next bit in line is again a 1, this time in the "fours" position so we multiply $b^2 * b$ by b^4 to arrive at $b^4 * b^2 * b$. The next bit is a 0 in the "eights" position which means that we must multiply $b^4 * b^2 * b$ by $b^0 = 1$.

This last multiplication does not change the value at this point, but it is important to note that whenever a 0 bit occurs in the binary representation, a multiplication by 1 must be performed; i.e., no multiplication at all. We are now almost done. The last or MSB is a 1 in the "16ths" position, so we multiply $b^4 * b^2 * b$ by b_{16} to arrive at $b_{16} * b^4 * b^2 * b$ or b_{23}. I count four multiplications and three squarings for a total of seven multiplications. Quite a bit less than the 22 needed for the first procedure and certainly more efficient!

To summarize the procedure just exemplified for computing b^x, we can procede as follows. First, choose a variable, let's call it "pwr", and initialize it to 1. Now proceed as follows:

```
WHILE there are some bits left in the bi
nary rep. for x DO
  BEGIN
    find the next bit;
    IF this bit is a one, THEN multiply
pwr by b;
    square the value of b
  END;
```

Note that we only multiply pwr by b if a bit is a 1. Also, we must always square the value of b. The reason is because each time we compute a new bit, it will be in the next position of the binary representation of x. Lastly, note that no multiplication is performed if the next bit is a 0.

Our next task is to translate the above outline, *pseudocode* as it is called in Pascal circles, into a true Pascal function. Let's take each line at a time.

```
WHILE there are some bits left in the bi
nary rep. for x DO is easily translated
into,
```

```
WHILE x <> 0 DO
```

because when x < > 0, there must be some bits left in its binary representation. The next line, Find the next bit, suggests a simple modification of the DECTOBIN part of last month's program. Since we only wish to know whether the next bit is a 1 or a 0, we do not need the entire DECTOBIN portion of that program. Here's the code:

```
rmdr := x MOD 2;
x := x DIV 2;
```

The next line in the pseudocode for intpower is now very simple. It is translated as,

```
IF rmdr = 1 THEN pwr := pwr * b;
```

The last line is also just as simple:

```
b := b * b or, if you prefer, b := sqr(b
).
```

Now let's put it all together. First we declare the function in which b and x are, respectively, the base and the exponent.

```
FUNCTION intpower(b:REAL; x:INTEGER):REA
L;
VAR pwr:REAL
    rmdr:INTEGER;
BEGIN  (* intpower *)
  pwr := 1.0;
  WHILE x <> 0 DO
    BEGIN
      rmdr := x MOD 2;
      x := x DIV 2;
      IF rmdr = 1 THEN pwr := pwr * b;
      b := b * b
    END;
  intpower := pwr
END;
```

That's all there is to it! By the way, one advantage that this procedure has over BASIC's b↑1x is accuracy. Try, for example, computing 7↑12 in BASIC. It might surprise you to find that 49 *is not* obtained as expected. You will get 49 using the above procedure. An explanation will be given next month.

Here is a program which will allow you to test the above procedure for whatever input you desire:

```
PROGRAM power(INPUT,OUTPUT);
VAR y,base:REAL;
    i,exp:INTEGER;

FUNCTION intpower(b:REAL,x:INTEGER):REAL
;
(* code as given above *)

PROCEDURE page;
BEGIN
  WRITE(CHR(147))
END;
```

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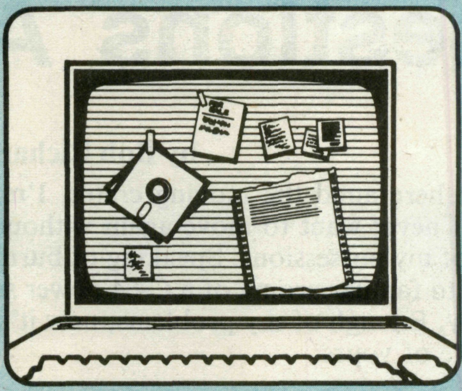
Messages are automatically formatted for full right/left justification, and may be read by individual selection. The user is provided with the ability to scan all new messages, messages addressed to the user, or messages written by the user. A new mail forwarding option is also included. Maximum SAVE time for a message on the 1541 is **only 7 seconds!**

E-Mail commands are in a separate menu and allow individual deletion and E-mail forwarding. E-Mail check at sign-on is performed in as little as 1/2 second.

Other features include:

- Fully supported by **both** X-Modem and New Punter (C1) protocols
- Supports up to **four** dual drives
- Download libraries may be organized in up to 99 directories, with as many as 99 files in each directory (depending, of course, on the capacity of the disk drive configuration being used)
- Each directory may have its own user security level, cost (if any), and read/write status
- Directories are stored on the file transfer disk, **not** the data disk so transfer disks may be conveniently changed **while** a user is online!
- A unique Personal File Tranfer system which allows a user to send a program to another individual user



- **Other features:** — system poll/survey; history log; nickname; phone number; remote sysop access; information files; **accurate** clock/calendar; fully automated **unattended** operation; emergency file restoration and the ability to later add user expansion modules

Modems supported by **SEQUEL** include the Commodore 1650, the "old" 1660, the 1200 baud 1670, Mitey Mo, MPP 1064, the Westridge 6420, Hayes Smartmodem, VolksModem, TransCom and many others which are compatible with the ones listed above.

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```
BEGIN (* main program *)
  page;
  WRITELN('Enter a real base and an');
  WRITELN('integer exponent.');
  FOR i := 1 O 5 DO
    BEGIN
      READLN(base,exp);WRITELN;
      y := intpower(base,exp);
      WRITELN('The result is',y:5:11);WR
ITELN;
      WRITELN('Enter a real base and an'
);
      WRITELN('integer exponent.');
    END
END.
```

Addenda: The function intpower and the main program were again developed using the Super Pascal 64 compiler from Abacus Software which, as I mentioned last month, will be reviewed in an upcomin column. However, some comments are in orde Super Pascal will not compile a program written i both upper and lower case as given here; that particular style is mine. Also, Super Pascal does not implement the procedure PAGE as many Pascal's do The above program shows how easy it is to implemen on the C-64.

The author welcomes comments and suggestion concerning this column. The interested reader ma write to the author at P.O. Box 43, Guilderland, N 12084

■

BASIC ALLEY: Questions Answered FRE(0)

by Bob Richardson

As I sit here amid the moving crates, I'm convinced that I never want to move again without first burning all of my possessions. Speaking of burning, I smell the all to familar aroma of a C-64 power supply melting away. Enough of my problems; now it's time to solve some of yours:

Q — I am not a musician, nor am I an acoustic scientist. I simply want to use a "beep" tone within my BASIC program. Short of an intensive education in SID programming, how can I do that?

A — To get a simple beep, use this simple subroutine:

```
1000 REM ****  BEEP ROUTINE  ****
1001 POKE 54296,15:REM SETS VOLUME ON FU
LL
1002 POKE 54278,240:REM FULL SUSTAIN FOR
 BEEP
1003 POKE 54273,75:REM SET PITCH OF BEEP
1004 POKE 54276,33:REM TURN ON SOUND GEN
ERATOR
1005 FOR J=1 TO 500:NEXT:REM DELAY LOOP
1006 POKE 542776,0:REM TURN OFF SOUND GE
NERATOR
1007 RETURN
```

And now, (you guessed it), a medium-lengt dissertation on how this program uses the SID chi . . .

Line 2001 sets the volumne to the maximu value the SID can produce. For a softer beep, use value between 1 and 15; a value of zero will completely silence SID. Next, line 1002 tells SID to hold an tone at full volumne as long as the oscillator (ton generator) is on. Then line 1003 determines the pitc of the beep. A value in the range of 0 through 5 is ver low, while the maximum value of 255 produces a ear-piercing shrill tone that is sure to irritate everyon in the computer room. Now the action happens: Lin 1004 turns on oscillator number one with SAWTOOTH waveform. This produces a shar sound with may overtones. For a more "gentle" beep substitute the value 17 insatead of 33, which produce the flute-like triangle waveform. The beep lasts fo the duration of the loop in line 1005, and th oscillator is silenced in line 1006.

For those of you who like to cram things all o one line, the subroutin can be reduced to this:

```
1001 POKE54296,15:POKE54278,240:POKE5427
3,75:POKE54276,33
1002 FORJ=1TO500:NEXT:POKE54276,0:RETURN
```

Truly a simple method for ading sound to any of your programs. For practice, try expanding the subroutine to produce a two-tone "ambulance" siren effect by alternating the value POKE'd into 54273. Or try making a beep that repeats, growing steadily louder until the user presses a key.

```
OPEN 15,8,15,"UO>M1":CLOSE15
```

Now you may format a new disk just like you would on a 1541, but you will get 1328 free blocks instead of the customary 664. As a sidenote, you can still read files created on this disk with a 1541 as long as they reside on side one of the disk. You may not "flip" the disk to get at the other side, because to the 1541 it will appear upside-down and backwards: totally unreadable.

Q — On the Amiga, when I go to DELETE a directory, I am told that I cannot because it contains files. If I do not care about these files, can I delete the directory without indiviidually deleting each file?

A — AmigaDOS has an option for the DELETE command called ALL. For example: if the directroy you wanted to delete was called MYDIR, then you would use the following commmand sequence:

```
1> delete mydir all
```

AmigaDOS would then print the name of each file in the directory as it was deleted, and finally the directory name. A word to the wise: be positively SURE that it's ok to delete the files in the directory because AmigaDOS will not give you a second chance to change your mind. Be forewarned also that any SUBDIRECTORIES within the deleted directory will be completely erased, including their files and subdirectories, etc.

Q — Why does C128 BASIC 7.0 run slower than C64 BASIC 2.0?

A — BASIC instructions are stored by the computer in what are called TOKENS. Tokens are simply a form of shorthand that enables the computer to quickly determine what command it is currently interpreting. Also, because a token is shorter than an entire word (like PRINT or INPUT, etc.), it takes less storage space — especially important on computers like the VIC-20 with limited memory.

On the C64, tokens are stored in a single byte, that is they only take up one memory location. BASIC 7.0, on the other hand, has so many new and wonderful commands that its tokens must occupy two bytes. The extra processing overhead for the additional byte is what slows BASIC 7.0 down in comparision to BASIC 2.0.

There is a way to make your C128 programs run almost twice as fast as on a C64: through use of the FAST command. For example, try the following program:

```
10 DIM A(500)
20 FOR J=1 TO 500:A(J)=RND(1):NEXT:REM
FILL ARRAY WITH RANDOM NUMBERS
30 PRINT"START...";
40 B=0:FORJ=1TO500:B=B+A(J):NEXT:B=B/50
0:REM FIGURE AVERAGE OF NUMBERS
50 PRINT"STOP":PRINT"AVERAGE IS:";B
```

Grab your stopwatch and run this program. After a few seconds of computation, the average of 500 random numbers will appear (which should be somewhere arond .5, but not always the same). Now add the following lines to the program:

```
35 FAST
45 SLOW
```

Now run the program and see the improvement made. If you are using a 40 column display, you will notice that the screen blanks out while the FAST command is in effect. This happens because when the 128 goes into the double speed mode, the VIC chip cannot keep up and shuts itself off. This will not happen on an 80 column display because that video display is generated by a different video chip which is isolation from the computer.

Q — Just how many computers has Commodore designed over the years?

A — That's a good question . . . let me see . . . For the sake of interest, I'll approach the question literally, and in so doing include a variety of machines that have been designed and announced, but in reality never made it to the retail shelves. Such a list would include the PET 2001, 4016, 4032, 8032, and SuperPET, the B128, B256, C128 (old), C128 (the one that you can actually buy), the P128, MAX, C16, Plus/4, Vic-20, the SX-64, the Educator 64 (with built in green-screen monitor, and currently available for the first time through some of the mail-order liquidators), the C64, SuperVIC, PC-10, PC-20, the LCD lap held, their Commodore 900 (a UNIX system), and the Amiga. It's quite likely that I've forgotten a few, but that should give you a few to think about.

Do you have a question you need answered that's keeping you awake at night? If so, send it in and let me see if I can answer *it for you.*

The Game of Life

Simulations of Birth and Death In a Closed Computer Universe

by Ken Denniston

Life is a fascinating game devised by mathematician John Horton Conway, and introduced by Martin Gardner in the "Mathematical Games" column of *Scientific American* in October, 1970. It is not a competitive game. It is not a game at all in the usual sense.

It is a mathematical simulation which allows you to explore an intriguing new world. Life can be visualized as a simulation of the history of a colony of organisms which occupy the squares of a grid like checkers on a checkerboard.

Each square can be occupied by one organism, or cell. Since each square is surrounded by eight neighboring squares, each cell can have up to eight neighbors. Conway carefully devised rules for the survival of cells that would make the behavior of a colony of cells unpredictable.

Conway's criteria for the survival of cells can be expressed in the following two rules:

1. Survival: Each cell with either two or three neighbors survives to the next generation.
2. Birth: A cell is born in each empty area with exactly three neighbors.

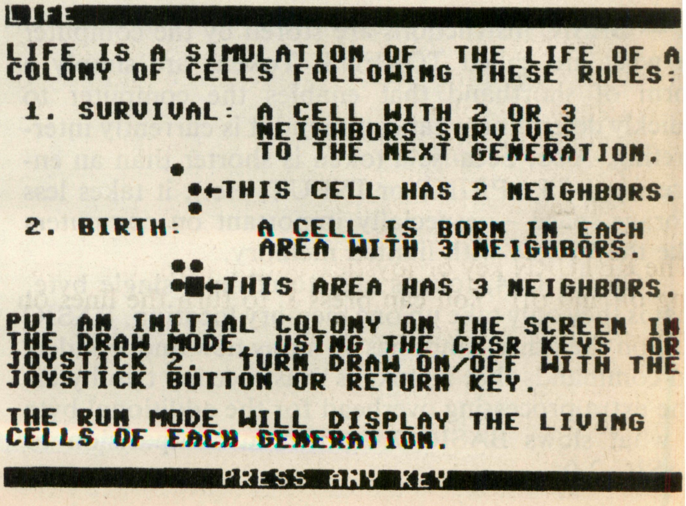
Births and deaths take place simultaneously so that the population of one generation will determine the population of the next generation.

The obvious implication of the rule of survival is that cells which have more than three neighbors, or less than two neighbors will die. Therefore, either *overpopulation or isolation* is fatal to cells.

The rule of birth dictates that the population density must be ideal for a birth to occur.

You may be struck by the *similarities* of Life to problems of population growth. These similarities are interesting, but the beauty of Life lies in the fact that by the application of these simple rules and an initial colony of a few cells, extraordinary and elaborate colonies will emerge.

Colonies can grow to immense proportions only to recede and die out entirely. Some colonies reach a steady state in which no cells die and no new cells are born. Other colonies develop into patterns which repeat over a period of two or more generations. These oscillating patterns can be objects of beautifully animated symmetry and sometimes produce surprising results.



```
LIFE

LIFE IS A SIMULATION OF  THE LIFE OF A
COLONY OF CELLS FOLLOWING THESE RULES:

 1. SURVIVAL: A CELL WITH 2 OR 3
              NEIGHBORS SURVIVES
              TO THE NEXT GENERATION.
         ●
          ●←THIS CELL HAS 2 NEIGHBORS.
          ●
 2. BIRTH:    A CELL IS BORN IN EACH
              AREA WITH 3 NEIGHBORS.
         ●●
         ●█←THIS AREA HAS 3 NEIGHBORS.

PUT AN INITIAL COLONY ON THE SCREEN IN
THE DRAW MODE, USING THE CRSR KEYS  OR
JOYSTICK 2.  TURN DRAW ON/OFF WITH THE
JOYSTICK BUTTON OR RETURN KEY.

THE RUN MODE WILL DISPLAY THE LIVING
CELLS OF EACH GENERATION.

               PRESS ANY KEY
```

Computers and Life

Life can be played manually, using a board like a checkerboard and checker type counters. This may seem like a boring, tedious activity. Because it seemed so to early Life enthusiasts, too, computers were soon put to work doing all the calculations necessary to follow the progress of a colony of cells. However, computer time was expensive in the early days and it was difficult to explain to your serious-minded supervisor that you were tracking the history of a new Life form for 1200 generations, not to mention the difficulty explaining the huge stack of printout on the floor.

With the development of the personal computer, the time is ripe for a Life renaissance. The cells of each generation of a colony easily can be calculated and displayed on the screen. Cells mystically appear and disappear as if they were really alive. The evolution of colonies can be observed for hundreds of generations.

A life program can be written easily in BASIC for the Commodore 64. However, BASIC Life programs are notoriously slow. Some time ago I wrote a simple Life program which took 12 seconds per generation. To solve the speed problem the calculating routines in the program listings for Life are written in machine language. This creates another problem. Machine language is too fast. At four generations per second it is difficult to see what is happening. The slow speed and stop features in this version of Life allow you to spend more time observing what is happening on the screen.

Program Operation

The operation of the program is largely self-evident. However, some features deserve explanation.

When the program is run, the word "LIFE" is displayed on the screen. This word then becomes a life colony, which you can watch for 232 generations. The sequence then repeats. You can press the **Y** key at any time to see the instructions.

There are two basic modes of operation in the program. One is the DRAW mode which allows you to put an initial colony on the screen. The other is the RUN mode in which the computer calculates and displays successive generations of cells.

You can use the cursor keys or a joystick plugged into port 2 to draw on the screen in the Draw mode. The RETURN key or joystick button turns the drawing on and off. You can press **L** to turn the lines on and off. The function keys control other drawing options. Press **f1** to clear the screen, **f3** to change the color of the cells and **f5** to see the instructions. Press **f7** to go to the RUN mode.

The function keys perform different operations in the RUN mode. The options are displayed at the bottom of the screen. Press **f7** to STOP and RUN. The colony is not erased when you press **f1** and return to the DRAW mode. This allows you to modify the colony on the screen.

Common Life Forms

The second screen of instructions displays some common Life forms. These forms illustrate some of the interesting results of the application of Conway's simple rules.

For example, consider the "box". The four cells are situated in such a way that each cell has three neighbors. Since each cell has three neighbors, it survives to the next generation. The empty squares surrounding the box have only one or two neighbors each. Since three neighbors are required for a birth, no new cells are born adjacent to the box. Therefore, the box remains stable from one generation to the next. One might say that such colonies in Life are immortal.

There are many other stable forms. Some can be quite large. For example the "boat" can be any length. However, larger stable forms seldom occur naturally.

Perhaps more interesting than stable forms are "oscillators", or patterns that repeat over a period of two or more generations.

The smallest and most common oscillator is the "blinker", consisting of three cells in a row. The cells at each end have only one neighbor, so they both die. The cell in the middle has two neighbors, so it survives. Meanwhile, the squares on each side of the middle cell have three neighbors, so new cells are born there. The result is that a row of three cells appears at right angles to the old row in the next generation. The following generation will "blink" back to the original configuration, so the oscillator has a period of two generations. The other oscillators displayed are also period two oscillators.

The first colony at the bottom of the screen develops into a period three oscillator called "pulsar CP 48 56 72". You will understand the numbers if you observe this oscillator.

Some of the most intriguing forms are those which repeat in such a way that the colony moves across the screen. Two examples are the "glider" and the "space ship". You can press **G** and **S** in the Draw mode to place these on the screen. You might also try to construct larger space ships.

If you press **T** for "title" in the Draw mode, the "LIFE" title will appear on the screen. This allows you to investigate some of the interesting results of this complex colony.

You will notice that a set of four blinkers appears at generation 31 at the lower right of the screen. This

configuration is called "traffic lights". At generation 186 one half of pulsar CP 48 56 72 develops at the top of the screen. I call this "pulsar CP 24 28 36". At generation 197 you will notice a short lived glider at the bottom of the screen.

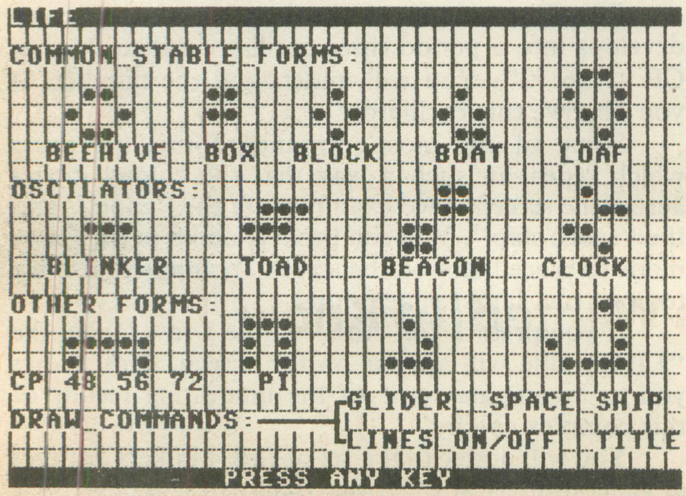
You might try different initial colonies to see what happens. Try, for example, straight lines of different lengths. The results will be different for each length. There is one that evolves to an interesting period 15 oscillator. Try a diagonal line. Here the result is always the same. Try to predict what it will be before watching it on the screen.

Life in a Finite Universe

The early discussions of Life assumed a grid of unlimited size. However, the size of the universe where cells can live must be limited in a computer simulation. In this case the size is limited by the size of the screen on the Commodore 64, or 23 cells by 38 cells. The screen size was changed to 38 columns to prevent cells from "wrapping" around from one side to the other.

These size limitations do have some drawbacks. Large colonies cannot be investigated. For example the form called "pi" will grow until it crashes into the side of the screen. Whenever this happens, the subsequent development of the colony will most likely be different from how it would have been in an infinite universe.

Conway attempted to construct the rules for Life in such a way that a colony would not grow indefinitely. He thought this impossible and offered a reward for anyone who found one that did. It was not long before such a colony was discovered. The colony was called a "glider gun" because it generated a glider every 28 generations. However, it is not possible for a colony to grow indefinitely in a finite universe. Furthermore, the glider gun is too large to reproduce on the screen of the 64.



Life at the Edge of the Universe

Life in a finite universe can be fascinating, however, because interesting and surprising things can happen at the edge of the universe.

A glider turns into a box when it reaches the edge of the screen. Watch the screen to see what happens when a space ship hits the edge. One half of certain symmetrical forms can exist as a single mirror image at the edge of the screen. One of the more interesting is pulsar CP 24 28 36, which develops at the top of the screen when the word "LIFE" is used as the initial colony. It is also possible for half of this oscillator to exist in a corner of the universe. Try to discover a simple initial colony that will develop into this oscillator.

VIC Program Notes

Due to the screen size and memory limitations of the VIC 20, it was necessary to eliminate some program features. However, most of these are cosmetic.

For example, the special characters for the grid were not used. The screen is allowed to wrap in the normal way in the VIC version. You can watch a space ship fly off the right side of the screen and appear one line lower on the left.

Press **H** (help) in the DRAW mode to see the single page of instructions. Press **f3** in the RUN mode to toggle the speed between fast and slow.

Incidentally, one benefit of the VIC's smaller screen is that the speed is faster, displaying about six generations per second in the fast mode.

The colony that makes up the "LIFE" title is different, and the results are different, but similar. A glider forms at the lower right at generation 51. Then traffic lights form at the top. A loaf forms at the bottom at generation 56. At generation 145 a small boat appears near the loaf. Finally, CP 24 28 36 forms at the top of the screen at generation 209. The remaining clutter is soon reduced to two boxes.

The program was designed to run on an unexpanded VIC. You cannot use a VIC with memory expansion which changes the location of screen memory. Only the 3K expander can be used.

However, even with the memory limitations and small screen size, there are many interesting Life forms that can be explored on the VIC. There are many amazing configurations of Life colonies. I will leave it to you to investigate new Life forms, to discover the surprising and fascinating development of your humble beginning colonies, and to wonder at the relationship between this complexity and the simple logic that controls the destiny of Life.

■

LIFE Program Listing

```
0 rem---life for c64---
by ken den-
niston  1214 washington,  the dalles, or-
 97058
10 poke53281,0:poke53280,6:poke53272,29:
poke53270,199:poke52,47:poke808,252
20 l$="[home][rvs on]life[spc 34][home][
7 right]
25 print"[clr][lt blu]"l$chr$(8)
30 poke56334,peek(56334)and254:poke1,pee
k(1)and251
40 x=41971:poke782,0:poke88,0:poke90,0
50 poke781,17:poke91,224:poke89,64:sysx
60 poke1,peek(1)or4:poke56334,peek(56334
)or1
70 gosub900
80 l=14*1024:forx=ltol+242:readr:pokex,r
:next
85 d$="[lt blu][home][24 dwn][rvs on]":n
$=chr$(0)
90 forx=1to6:a$=a$+"@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@[2 right]":next
95 c=5:de=60:j=56320:l(1)=42
99 rem intro
100 printd$"[spc 10]instructions? (y/n)[
spc 9][home]
110 gosub500:gosub400
120 sysl+72
130 forx=1to232:t=ti+300/x
140 getg$:gosub730:ifg$="y"org$="n"orpee
k(j)=111then180
150 ift>tithen140
160 sysl
170 nextx:goto110
180 ifg$="y"thengosub1000
199 rem  draw mode
200 gosub500
210 print"[red]"l$,"      draw mode"d$"f
keys: 1=new  3=color  5=help  7=run [hom
e]
215 x=11:y=19
220 sc=1064+x*40+y:pokesc,l(f)+128
230 gosub700:pokesc,l(f)
235 ifa=17orp=125thenifx<22thenx=x+1:got
o220
240 ifa=145orp=126thenifxthenx=x-1:goto2
20
250 ifa=29orp=119thenify<37theny=y+1:got
o220
```

Coming Next Month In The Guide

Sex & Computers

Everything You Always Wanted To Know

But *They* Were Afraid To Print

```
255 ifa=157orp=123thenifytheny=y-1:goto2
20
260 ifa=19then215
265 ifa=13orp=111thenf=1-f
270 ifa=133thengosub500:goto215
275 ifa=134thenc=1-c*(c<15):gosub500:got
o215
280 ifa=135thengosub1000:gosub500:goto20
0
282 ifa=136then300
284 ifg$="t"thengosub500:gosub400
286 ifg$="l"thengosub900
288 ifg$<>"g"thenifg$<>"s"then220
290 ifx<2orx>21ory<3ory>36then220
292 f=0:forz=39to41:pokesc+z,42:next:pok
esc+1,42
294 ifg$="g"thenpokesc-40,42:goto220
296 pokesc-3,42:pokesc+38,42:pokesc-39,4
2:pokesc-80,42:goto220
299 rem  life loop
300 print"[lt blu]"l$"generation[spc 7]p
opulation":f=0
310 printd$"[rvs on]f keys: 1=draw  3=sl
ow  5=fast  7=stop[home]":sysl+72:t=ti
320 print"[home][lt blu][rvs on]"tab(17)
g tab(34)peek(249)+peek(250)*256"[left]
":g=g+1
330 getg$:ifg$=""andpeek(j)=127then380
340 a=asc(g$+n$)
350 ifa=133then210
360 ifa=134thende=60
365 ifa=135thende=0:t=ti
370 ifa=136orpeek(j)=111thengosub600
375 ifa=3then740
380 ift>tithen330
390 sysl:t=ti+de:goto320
399 rem print life
400 print"[home][6 dwn]":poke646,c
410 print,"*@@@@@*@@****@@****
420 print,"*@@@@@*@@*@@@@@@*
430 print,"*@@@@@*@@***@@@***
440 print,"*@@@@@*@@*@@@@@@*
450 print,"****@@*@@*@@@@@@****
460 return
499 rem print screen
500 f=1:g=0:poke646,c:print"[home][dwn]"
a$a$a$right$(a$,200);:return
599 rem stop
600 printd$,,,"  7=run [home]
610 ifpeek(j)=111then610
620 gosub700:printd$,,,"  7=stop[home]":
return
699 rem get
700 k=0
710 getg$:p=peek(j):ifg$=""andp=127thenk
=1:goto710
720 ifkthenifp<127thenford=1to222:next
730 a=asc(g$+n$):ifa<>3thenreturn
740 print"[clr]"chr$(9):poke53272,21:pok
e53270,200:poke808,237:end
899 rem poke chrs
900 restore:lf=1-lf
910 forz=1to4:readch:fork=0to7:readd:pok
e12288+8*ch+k,dand(127+128*lf):next
930 iflf=0thenpoke12288+ch*8+7,0
940 next
950 return
999 rem   instructions
1000 gosub500:print"[lt blu]"l$"[home][2
 dwn][rvs off]life@is@a[right]simulation
[right]of@[right]the[right]life[right]of
[right]a
1010 print"colony[right]of[right]cells[r
ight]following[right]these[right]rules:
1030 print"[dwn][lt gry][right]1.[right]
survival:[right]a[right]cell[right]with[
right]2[right]or[right]3
1040 print,"[4 right]neighbors[right]sur
vives",,"[4 right]to[right]the[right]nex
t[right]generation.
1045 printspc9)"[grn]*[2 dwn]*[up][left]
[lt blu]*[back arrow]this[right]cell[rig
ht]has[right]2[right]neighbors.
1050 print"[dwn][right][lt gry]2.[right]
birth:[4 right]a[right]cell[right]is[rig
ht]born[right]in[right]each
1060 print,"[4 right]area[right]with[rig
ht]3[right]neighbors.
1070 printspc8)"[right][grn]**[dwn][2 le
ft]*[lt blu][rvs on] [rvs off][back arro
w]this[right]area[right]has[right]3[righ
t]neighbors.
1080 print"[dwn][lt grn]put[right]an[rig
ht]initial[right]colony[right]on[right]t
he[right]screen[right]in
1090 print"the[right]draw[right]mode,[ri
ght]using[right]the[right]crsr[right]key
s[2 right]or
1100 print"joystick[right]2.[2 right]tur
n[right]draw[right]on/off[right]with[rig
ht]the
1110 print"joystick[right]button[right]o
r[right]return[right]key.
1120 print"[lt blu][dwn]the[right]comput
er[right]will[right]display[right]the[ri
ght]living
1130 print"cells[right]of[right]each[rig
ht]generation.
1170 printd$"[lt blu][spc12]press any ke
y[spc13][home]
1180 poke198,0:gosub700
1200 gosub500
1210 print"[home][2 dwn][lt gry]common[r
ight]stable[right]forms:
1220 poke646,c:print,,,"[2 right]**",
1222 print"[4 right]**[5 right]**[5 righ
t]*[6 right]*[5 right]*[2 right]*
1224 print"[3 right]*[2 right]*[4 right]
**[4 right]*[right]*[4 right]*[right]*[5
 right]*[right]*
1226 print"[4 right]**[12 right]*[6 righ
t]**[6 right]*
1228 print"[lt blu][2 right]beehive[2 ri
ght]box[2 right]block[3 right]boat[3 rig
ht]loaf
1230 print"[dwn][lt gry]oscilators:",
1235 poke646,c
1240 print"[4 right]**[6 right]*
1242 print,"[4 right]***[7 right]**[7 ri
ght]**
1244 print"[4 right]***[6 right]***[6 ri
ght]**[7 right]**
1246 print,,"@@**@@@@@@@@@*
1248 print"[lt blu][2 right]blinker[4 ri
ght]toad[4 right]beacon[3 right]clock
1250 print"[dwn][lt gry]other forms:",,
1255 poke646,c
1260 print"[3 right]*
1262 print,"[3 right]***[6 right]*[11 ri
ght]*",
1264 print"[3 right]*****[5 right]*[righ
t]*[7 right]*[5 right]*[4 right]*
1266 print"[3 right]*[3 right]*[5 right]
*[right]*[5 right]***[6 right]*****",
1270 print"[lt blu]cp[right]48[right]56[
right]72[3 right]pi[2 right][dwn][<A>][l
t gry]g[lt blu]lider[2 right][lt gry]s[l
t blu]pace@ship
1280 print"[lt gry]draw@commands:[lt blu
][4 shift-*][<W>]
```

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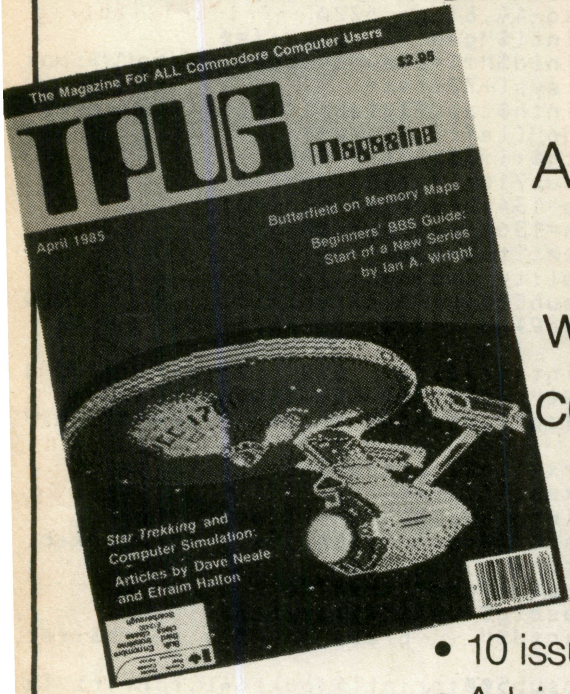

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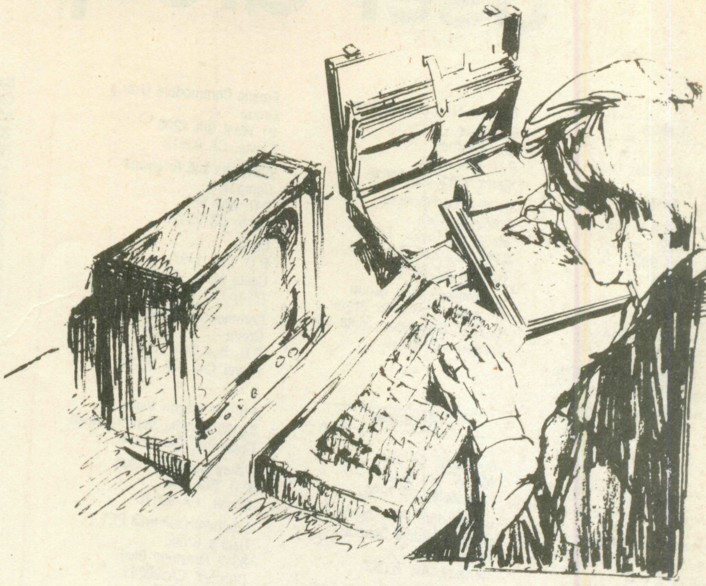
```
1282 printspc19)"[left][<Z>][lt gry]l[lt
 blu]ines[right]on/off[2 right][lt gry]t
[lt blu]itle
1290 gosub700:return
1799 rem chr data
1800 data0,128,128,128,128,128,128,128,1
70
1801 data042,128,156,190,190,190,156,128
,170
1802 data128,255,255,255,255,255,255,255
,255
1803 data170,255,227,193,193,193,227,255
,255
1999 rem ml data
2000 data169,4,133,252,169,40,133,251,16
9,64,133,254,169,40,133,253,160
2010 data,177,253,170,224,2,240,10,169,4
2,224,3,240,2,169,,145,251
2020 data24,165,253,105,1,133,253,165,25
4,105,,133,254,24,165,251,105,1
2030 data133,251,165,252,105,,133,252,20
1,7,208,207,165,251,201,192,208
2040 data201,234,169,,133,250,133,249,16
9,63,133,254,169,255,133,253,169
2050 data0,160,,145,253,24,165,253,105,1
,133,253,165,254,105,,133,254
2060 data201,68,208,233,169,4,133,252,16
9,40,133,251,169,63,133,254,169
2070 data255,133,253,160,,177,251,201,42
,208,30,24,165,249,105,1,133
2080 data249,165,250,105,,133,250,24,162
,0,188,235,56,177,253,105,1,145
2090 data253,232,224,8,208,242,24,165,25
3,105,1,133,253,165,254,105,
2100 data133,254,24,165,251,105,1,133,25
1,165,252,105,,133,252,201,7,208
2110 data188,165,251,201,192,208,182,234
2120 data169,64,133,254,169,78,133,253,1
69,,160,,145,253,200,145,253,24
2130 data165,253,105,40,133,253,165,254,
105,,133,254,201,68,208,230,96
2160 data,1,2,40,42,80,81,82
```

```
0 rem vic life  by ken denniston
10 poke36879,14:poke56,27:clr
20 c=5:h$="[home][rvs on]":l$="[wht][hom
e][rvs on]life[spc 18][home][6 right]
30 print"[clr]"chr$(8)l$
40 d$="[home][22 dwn][rvs on][wht]
50 diml(1):l=6912:forx=ltol+207:readz:po
kex,z:next
60 b=8185:de=60:l(0)=32:l(1)=81
100 gosub400:gosub800:sysl+72
130 forx=1to232:t=ti+300/x
140 getg$:ifg$<>""thengosub1000:goto200
150 ift>tithen140
170 sysl:nextx:goto100
200 gosub500
210 poke646,2:printmid$(l$,2)" draw mode
"d$"f1=new f3=color f7=ru"h$:pokeb,142:x
=10:y=x
220 sc=7702+x*22+y:pokesc,l(f)+128
230 gosub700:pokesc,l(f)
235 ifa=17thenifx<20thenx=x+1:goto220
240 ifa=145thenifxthenx=x-1:goto220
250 ifa=29thenify<21theny=y+1:goto220
255 ifa=157thenifytheny=y-1:goto220
260 ifa=19then210
265 ifa=13thenf=1-f
270 ifa=133then200
275 ifa=134thenc=1-c*(c<7):goto200
280 ifa=136then300
282 ifg$="h"thengosub1000:goto200
284 ifg$="t"thengosub400:goto210
288 ifg$<>"g"thenifg$<>"s"then220
290 ifx<2orx>18then220
292 f=0:forz=21to23:pokesc+z,81:next:pok
esc+1,81
294 ifg$="g"thenpokesc-22,81:goto220
296 pokesc-3,81:pokesc+20,81:pokesc-21,8
1:pokesc-44,81:goto220
300 printl$"gen      pop":f=0
310 printd$"f1=draw 3=speed 7=sto"h$:pok
eb,144:sysl+72:t=ti
320 printh$tab(9)gtab(17)peek(249)+peek(
250)*256"[left] ":g=g+1
330 getg$:ifg$=""then380
350 gosub710:ifa=133then210
360 ifa=134thende=60-de:t=ti
370 ifa=136thengosub600
380 ift>tithen330
390 sysl:t=ti+de:goto320
400 gosub500:printh$:print"     Q    Q QQQ
 QQQ"spc9)"Q   Q Q   Q"spc11)"Q   Q QQ
QQ";
410 printspc10)"Q   Q Q   Q"spc11)"QQQ Q
 Q  QQQ"spc53)"QQQQQQQQQQQQQ":return
500 f=1:g=0:poke646,c:print"[home][dwn]"
;
510 forx=1to21:print"[spc 22]";:next
520 pokeb,160:return
600 printd$spc18)"run"h$:pokeb,160
610 gosub700:printd$spc18)"sto"h$:pokeb,
144:return
700 getg$:ifg$=""then700
710 a=asc(g$+chr$(0)):return
800 printd$"    press any key    "h$:ret
urn
1000 gosub500:printl$:poke646,c:print"[h
ome][2 dwn]rules of life:
1020 print" 1.a cell with 2 or 3    neig
hbors lives.",,,
1030 print" 2.a cell is born in[spc 5]ea
ch area with 3[spc 6]neighbors.",,,
1040 print"draw an initial colony with t
he crsr keys.",,,
1050 print"draw commands:",,,
1060 print" return=draw on/off"spc9)"g=g
lider"spc14)"s=space ship"spc10)"h=help
1070 gosub800:gosub700:return
2000 data 169,30,133,252,169,22,133,251,
169,28,133,254,169,22,133,253,160
2010 data0,177,253,170,224,2,240,10,169,
81,224,3,240,2,169,32,145,251
2020 data24,165,253,105,1,133,253,165,25
4,105,0,133,254,24,165,251,105
2030 data1,133,251,165,252,105,0,133,252
,201,31,208,207,165,251,201,228
2040 data208,201,234,169,0,133,250,133,2
49,169,27,133,254,169,255,133,253
2050 data169,,160,,145,253,24,165,253,10
5,1,133,253,165,254
2060 data105,,133,254,201,30,208,233,169
,30,133,252,169,22,133,251
2070 data 169,27,133,254,169,255,133,253
,160,,177,251,201,81,208,30,24
2080 data165,249,105,1,133,249,165,250,1
05,,133,250,24,162,,188,200,27
2090 data177,253,105,1,145,253,232,224,8
,208,242,24,165,253,105,1,133
2100 data253,165,254,105,,133,254,24,165
,251,105,1,133,251,165,252,105,
2110 data133,252,201,31,208,188,165,251,
201,228,208,182,96,,1,2,22,24,44,45,46
```

How To Type In Program Listings From The Guide



In order to typeset programs so that clear images may be printed in the pages of *The Guide*, it was necessary to deal with the problem of graphics characters that appear on the screen when you type in a capital letter in graphics mode, or when you choose graphic symbols for colors (instead of using POKEs, which occupy more memory space in your programs), etc.

To begin with, all programs appear in the text mode. You enter the text mode by pressing the Commodore key and the shift key simultaneously. This solves the problem of capital letters.

The other graphic symbols are replaced with letters the typesetting machine can *recognize*. For example, if the program shows [lt grn], you simultaneously press the Commodore key and 6, causing the graphic symbol for light green to be shown on your screen.

We hope this helps clear up any confusion you may have experienced. If you have any questions, please feel free to contact us. Have fun!

Program Shows:	Press Keys:	Screen Shows:
[blk]	ctrl–1	▨
[wht]	ctrl–2	▨
[red]	ctrl–3	▨
[cyn]	ctrl–4	▨
[pur]	ctrl–5	▨
[grn]	ctrl–6	▨
[blu]	ctrl–7	▨
[yel]	ctrl–8	▨
[rvs on]	ctrl–9	▨
[rvs off]	ctrl–0	▨
[orange]	Cmdr–1	▨
[brown]	Cmdr–2	▨
[lt red]	Cmdr–3	▨
[gray 1]	Cmdr–4	▨
[gray 2]	Cmdr–5	▨
[lt grn]	Cmdr–6	▨
[lt blu]	Cmdr–7	▨
[gray 3]	Cmdr–8	▨
[clr]	Shft–Clr	▨
[home]	Home	▨
[up]	Crsr–Up	▨
[dwn]	Crsr–Down	▨
[left]	Crsr–Left	▨
[right]	Crsr–Right	▨
[f1]	f1	▨
[f3]	f3	▨
[f5]	f5	▨
[f7]	f7	▨
[up-arrow]	Up Arrow	↑

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Wisconsin Association of
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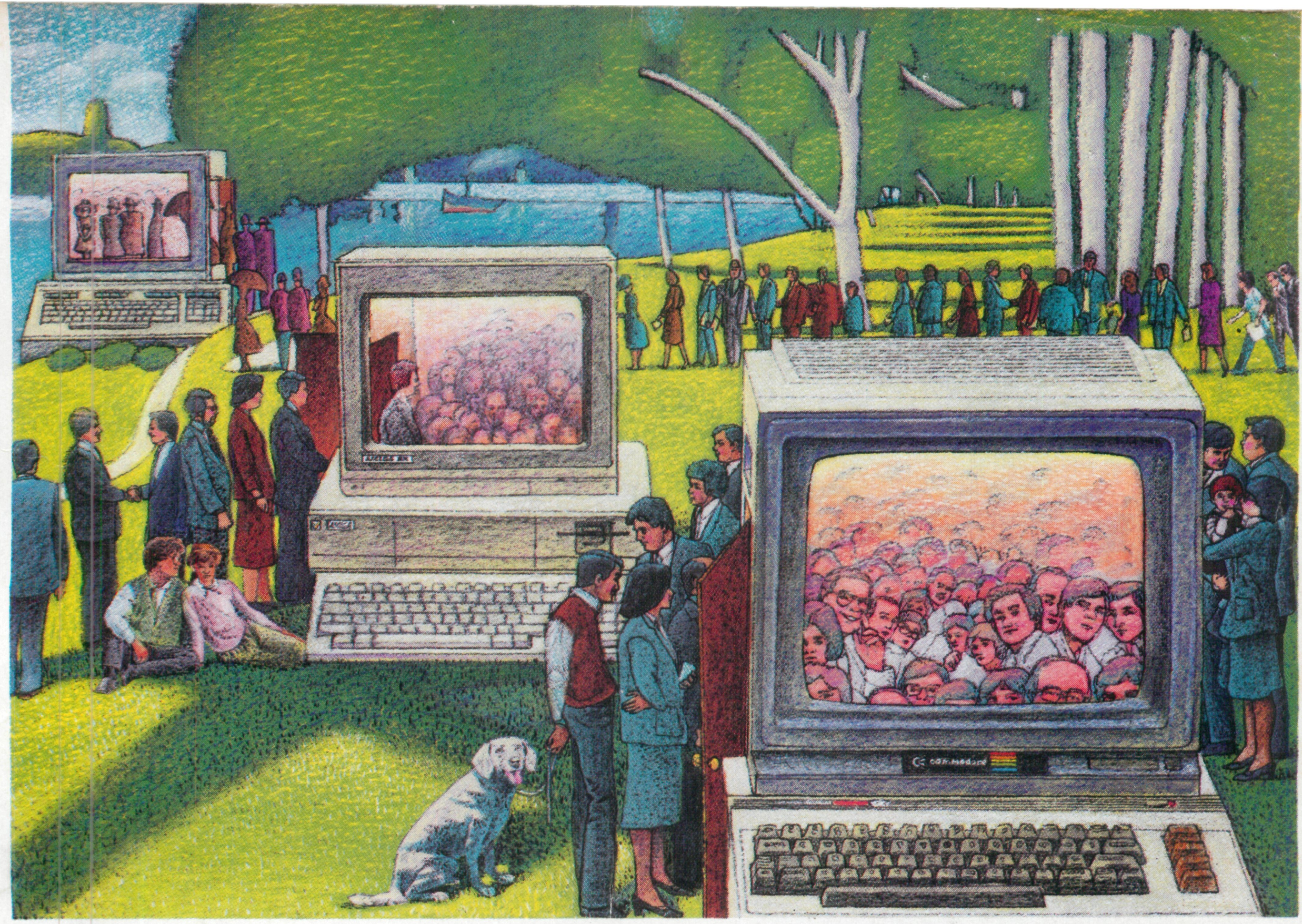

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